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CLAIMS

[Claim(s)]

[Claim 1]A disk reproduction device comprising:

A reproduction means which plays a music signal on a disk which is the first recording medium.

A recording means which records a reproduced output signal from said reproduction means to the second recording medium.

A recording level registration means which carries out level registration for switching manually a recording level which records a reproduced output signal from said reproduction means by said recording means to one of two or more steps.

A recording level setting-out means which changes the magnitude of attenuation or amplification by the contents of registration of said recording level registration means, and switches a recording level, A regeneration level setting-out means to set up by amending amplification only for quantity corresponding to variation of the magnitude of attenuation which it was combined with said reproduction means and set up by said recording level setting-out means to output said music signal to a loudspeaker etc.

[Claim 2]The disk reproduction device comprising according to claim 1:

A signal processing means which detects a peak value for every fixed time of a music signal recorded on a disk, and outputs the value with a digital signal.

A search operation control means controlled to perform a high-speed search operation by repeating reproduction motion and track jump operation by turns.

The 1st peak value memory measure that memorizes a peak value from said signal processing means in the Nth reproduction motion of said high-speed search operation.

The 2nd peak value memory measure that memorizes a peak value from said signal processing means in reproduction motion of eye ** (N-1) watch, A peak value storage control means which detects a signal reading error at the time of reproduction motion, and controls memory processing of said 1st peak value memory measure, A peak mean value calculating means which computes average value of a numerical value memorized by said 1st peak value memory measure and the 2nd peak value memory measure for every time of reproduction motion, A maximum memory measure which performs renewal of comparison for every time of reproduction motion, and memorizes the maximum of average value by said peak mean value calculating means, A recording level discriminating means which distinguishes height of a recording level of a music signal currently recorded on a disk by comparison with a sound recording reference value beforehand set to the maximum memorized by maximum memory measure at the time of said end of a high-speed search operation, and a recording level displaying means which displays the contents of an output of said recording level discriminating means.

[Claim 3]The disk reproduction device comprising according to claim 2:

A recording level setting-out means which changes the magnitude of attenuation or amplification by the contents of an output of said recording level discriminating means, and the contents of registration of said recording level registration means, and switches a recording level.

A regeneration level setting-out means to set up by amending amplification only for quantity corresponding to variation of the magnitude of attenuation which it was combined with said reproduction means and set up by said recording level setting-out means to output said music signal to a loudspeaker etc.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention A mini component stereo device, CD radio cassette recorder tape recorder, etc., It is related with the disk reproduction device provided with the recording function for recording the music signal in recording media, such as a compact disk, to other recording media, such as a magnetic recording medium, and the reproduced sound output circuit for monitor sound listening at the time of sound recording.

[0002]

[Description of the Prior Art]In recent years, in the disk reproduction device, the function for setting up and recording the optimal recording level automatically in the case of the sound recording to a tape recorder (part) etc. is used.

[0003]An example of the conventional disk reproduction device mentioned above is explained referring to drawings below.

[0004]Drawing 5 is a block diagram showing the composition of an example of the conventional disk reproduction device. 1 in drawing 5 Disk shape recording media, such as CD (it is hereafter expressed as a disk.), An optical pickup for 2 to read the signal currently recorded on the disk 1, The reproduction means which consists of an optical pickup actuator, a servo circuit for drive controlling, etc., The signal processing means which 3 receives the signal from the signal reading means 2, and changes it into an audio signal, and detects the peak value for every fixed time of the, and outputs the value as an 8-bit digital signal, The search operation control means controlled to perform a high-speed search operation when 4 repeats the reproduction motion for every fixed time, and track jump operation by turns to the signal reading means 2, The 1st peak value memory measure that memorizes the peak value from the signal processing means [in / in 5 / the Nth reproduction motion of the above-mentioned high-speed search operation] 3, 6 is 2nd peak value memory measure that similarly memorizes the peak value in the reproduction motion of eye ** (N-1) watch, and can consider the case where it constitutes so that two values, the big peak value to the 1st as an example and the big peak value to the 2nd, may be memorized etc. The peak value storage control means which 7 detects the signal reading error at the time of reproduction motion, and controls the memory processing by the peak value memory measure 5 of the above 1st, The peak mean value calculating means which computes the average value of the numerical value 8 is remembered to be by the 1st peak value memory measure 5 and the 2nd peak value memory measure 6 for every time of reproduction motion, The maximum memory measure which 9 performs renewal of comparison for every time of reproduction motion, and memorizes the maximum of the average value by the peak mean value calculating means 8, A recording level setting-out means to perform level setting at the time of 10 recording the above-mentioned audio signal to a magnetic recording means etc. by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of the above-mentioned end of a high-speed search operation, It is a switch (it is hereafter expressed as a peak search start switch.) for the DA conversion means from which 11 changes the digital audio signal from the signal processing means 3 into an analog signal, and 12 to start the recording means of a tape recorder etc., and for 13 start the above-mentioned peak level search operation. Generally 14 is called volume control volume etc. by the sound volume setting means which constitutes the audio signal from DA conversion means 11 so that the user of apparatus can set up the listening loudness level of sound freely. The audio signal amplifying means to which 15 carries out power amplification of the audio signal from the regeneration level setting-out means 14 with a fixed amplification factor, The loudspeaker from which 16

changes the audio electrical signal from the audio signal amplifying means 15 into a sound wave, 17 is a recording level discriminating means which distinguishes the height of the recording level of the music signal currently recorded on the disk by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of said end of a high-speed search operation. [0005] Drawing 6 and drawing 7 are the flow chart figures showing the contents of processing of each part shown in drawing 4. Hereafter, concrete operation of the conventional disk reproduction device is explained using drawing 5, drawing 6, and drawing 7.

[0006] If a peak search operation is started by turning on the peak search start switch 13, As shown in Steps 21 and 22 of drawing 6, the maximum memory measure 9, 1st, and 2nd peak value memory measure 5 and 6 is reset the first stage, and it controls for the search operation control means 4 to perform reproduction motion of fixed time, and track jump operation by turns to the reproduction means 2, and to perform a search operation. For example, as shown in Step 30 of drawing 6, whenever it reads a peak value 4 times, it is constituted so that a track jump may be carried out once.

[0007] The signal recorded on the disk 1 by the reproduction means 2 in reproduction motion is read, as shown in Step 23, it changes into an audio signal by the signal processing means 3, and the peak value for every fixed time is detected, and it outputs from the signal processing means 3. In the 1st peak value memory measure 5, since the big value to the 1st and the big value to the 2nd are memorized, if they are set to MX1 and MX2, it will update at Steps 27 and 29 of drawing 6, and will memorize to the 1st peak value memory measure 5. When a search operation has an error at this time and a peak value is not able to be detected, as it is shown in Steps 24 and 25, the minimum value is memorized among the reference values which perform error generation detection from the state of the search operation control means 4 by the peak value storage control means 7, and are later mentioned to the 1st peak value memory measure 5. Next, in Step 30, the number-of-times check of reading of a peak data value is performed, it returns to Step 23 and the above-mentioned processing is repeated until it reads 4 times, and it shifts to 31 or less-step processing from after 4 times reading. If the value equivalent to MX1 at the time of the reproduction motion before one and MX2 is memorized by the 2nd peak value memory measure 6 and they are set to MX3 and MX4, At Step 31 of drawing 6, the average value about MX1, MX2, MX3, and MX4 is computed by the peak mean value calculating means 8, and in Step 32, MX1 of the 1st peak value memory measure 5 and MX2 are transmitted to MX3 of the 2nd peak value memory measure 6, and MX4, respectively, and they are memorized. Next, by Step 33, the value computed by the above-mentioned peak mean value calculating means 8 is compared with the value memorized by the maximum memory measure 9, and if large, it will update at Step 34. At Step 35, if the search operation control means 4 performs track jump operation, it moves to the following reproduction portions and the search operation of the whole necessary part of the disk 1 is not completed, it returns from Step 36 to Step 22, and the processing for the above-mentioned all-encompassing calculation is repeated.

[0008] After the end of a search operation distinguishes it at Step 36, and shifts from Step 37 to processing of Step 40. That is, by the recording level setting-out means 10, comparison with the reference value beforehand set to the value memorized by the maximum memory measure 9 is performed, and a recording level is set up. For example, it is A0h (a hexadecimal number is expressed.) about a reference value. hereafter if the same D0h -- more than A0h -- the recording level of the input by the recording means 12 -- usual -- 3-dB attenuation and D -- 0h or more is set up like [usual] 6-dB attenuation.

[0009] As mentioned above, with the recording level set up by the recording level setting-out means 10, the audio signal of the signal processing means 3 is changed into an analog signal by DA conversion means 11, and sound recording operation is performed by the recording means 12.

[0010] On the other hand, the music signal on the disk 1 heard as a sound by the loudspeaker 16, It is inputted into the sound volume setting means 14 from the output of DA conversion means 11, and is set as the volume which the user of apparatus wishes here, and the music signal which received power amplification by the audio signal amplifying means 15 is inputted into the loudspeaker 16, and is outputted as a sound wave signal.

[0011] [Problem(s) to be Solved by the Invention] However, the above conventional disk reproduction devices, The analog attenuator circuit which comprises IC or the transistor which had to perform recording level setting out by the recording means of the latter part of a DA conversion means, outputted the signal from the output port of the microcomputer as a recording level setting-out means, and was provided in the input of the recording means, a resistor, etc. needed to be driven. For this reason, if it is going to make it switch the some steps recording level recorded to magnetic tape etc. according to a user's liking by a recording means, the output

port of a microcomputer will be increased, Unless it enlarged the scale of the analog attenuator circuit, it could not realize, but there was a problem of being a serious high cost.

[0012] This invention takes an example by the above-mentioned conventional problem, It aims at providing the highly efficient and cheap disk reproduction device which can switch the recording level recorded to magnetic tape etc. without needing the analog attenuator circuit as a recording level setting-out means to several steps according to a user's liking.

[0013]

[Means for Solving the Problem] In order to solve an aforementioned problem, a disk reproduction device of this invention is characterized by comprising the following:

A reproduction means which plays a music signal on a disk which is the first recording medium.

A recording means which records a reproduced output signal from said reproduction means to the second recording medium.

A recording level registration means which carries out level registration for switching manually a recording level which records a reproduced output signal from said reproduction means by said recording means to one of two or more steps.

A signal processing means which detects a peak value for every fixed time of a music signal recorded on a disk, and outputs the value with a digital signal, A search operation control means controlled to perform a high-speed search operation by repeating reproduction motion and track jump operation by turns, The 1st peak value memory measure that memorizes a peak value from said signal processing means in the Nth reproduction motion of said high-speed search operation, The 2nd peak value memory measure that memorizes a peak value from said signal processing means in reproduction motion of eye $(N-1)$ watch, A peak value storage control means which detects a signal reading error at the time of reproduction motion, and controls memory processing of said 1st peak value memory measure, A peak mean value calculating means which computes average value of a numerical value memorized by said 1st peak value memory measure and the 2nd peak value memory measure for every time of reproduction motion, A maximum memory measure which performs renewal of comparison for every time of reproduction motion, and memorizes the maximum of average value by said peak mean value calculating means, A recording level discriminating means which distinguishes height of a recording level of a music signal currently recorded on a disk by comparison with a sound recording reference value beforehand set to the maximum memorized by maximum memory measure at the time of said end of a high-speed search operation, A recording level displaying means which displays the contents of an output of said recording level discriminating means, A recording level setting-out means which changes the magnitude of attenuation or amplification by the contents of an output of said recording level discriminating means, and the contents of registration of said recording level registration means, and switches a recording level, A regeneration level setting-out means to set up by amending the magnitude of attenuation at the time of only quantity corresponding to variation of the magnitude of attenuation which it was combined with said reproduction means and set up by said recording level setting-out means outputting said music signal to a loudspeaker etc.

[0014]

[Function] This invention can perform recording level registration for switching the recording level at the time of recording to magnetic tape etc. from a disk to one of two or more steps by the above-mentioned composition according to a user's liking, While distinguishing and displaying the height of the recording level of the music signal currently recorded on the disk, The magnitude of attenuation in the electronic volume at the time of only the quantity corresponding to change of the magnitude of attenuation for the recording level change by a signal processing means outputting a music signal to a loudspeaker at the same time it switches a recording level with the digital attenuator of a signal processing means according to the discriminated result and the contents of recording level registration of the recording level. Since it sets up by amending, the highly efficient and cheap disk reproduction device which can switch a recording level to several steps according to a user's liking without needing an analog attenuator circuit is realizable.

[0015]

[Example] Hereafter, the disk reproduction device of one example of this invention is explained in detail, referring to drawing 1 - drawing 4. Drawing 5 - the number same about the same component part as drawing 7 are given, and explanation is omitted.

[0016] Drawing 1 is a block diagram showing the composition of the disk reproduction device in the example of

this invention.

[0017]In drawing 1, at the same time 41 receives the signal from the signal reading means 2, detects the peak value for every fixed time of the and outputs the value as an 8-bit digital signal, The signal processing means provided with the composition which attenuates the above-mentioned audio signal in digital one, and can output the control signal from a recording level setting-out means 43 to mention later while changing the signal into an audio signal by publicly known digital signal processing technology, by the arithmetic processing circuit inside a receptacle, The recording level displaying means as which 42 displays the recording level of the music signal on a disk on a liquid crystal display etc. according to the contents of an output of the recording level discriminating means 17, 43 by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of the above-mentioned end of a high-speed search operation. The recording level setting-out means which controls a regeneration level setting-out means 46 to output the control signal for level setting at the time of recording the above-mentioned audio signal by the recording means 45 mentioned later, such as a magnetic recording means, to the signal processing means 41, and to mention later, A recording level registration means to set up level registration for 44 to switch manually the level which records the reproduced output signal from the reproduction means 2 by the recording means 45 to one of two or more steps with the position change of a mechanical switch, etc., The recording means of composition of performing sound recording operation with fixed amplification without 45 having an analog attenuator circuit which comprises an IC or a transistor, a resistor, etc. unlike the disk reproduction device of a conventional example to the input, Although 46 is the regeneration level setting-out means constituted in the audio signal from DA conversion means 11 so that the user of apparatus could set up the listening level freely and is generally called volume control volume etc., It is called the electronic volume also having the function which can fluctuate the magnitude of attenuation or the amplifying amount of an audio signal with the control signal from the recording level setting-out means 43 in this example, etc.

[0018]Drawing 2 - drawing 4 are the flow chart figures showing the contents of processing of each part shown in drawing 1. About the disk reproduction device constituted as mentioned above, the operation is explained below.

[0019]The recording level registration means 44 first assumes that the stage of height switched the position of the mechanical switch manually, and has registered the recording level which a user wants to record from the inside of those with a three-stage, "HIGH", "NORMAL", and "LOW." The contents of registration of this recording level registration means 44 can detect that setting-out position by reading the terminal voltage of a mechanical switch with a microcomputer.

[0020]If a peak search operation is started by turning on the peak search start switch 13, As shown in Steps 51 and 22 of drawing 2, the peak mean value calculating means 8, 1st, and 2nd peak value memory measure 5 and 6 is reset the first stage, and the digital magnitude of attenuation of the signal processing means 41 is set as a standard value of -4dB. Setting the digital magnitude of attenuation of the signal processing means 41 as -4 dB instead of 0 dB here cannot be amplified by the signal processing means 41, but it is only decreasing, It is because it is necessary to make the digital magnitude of attenuation smaller than a normal condition depending on the contents of registration of the recording level of the disk 1, or the recording level registration means 44, and to enlarge a recording level.

[0021]Next, it controls for the search operation control means 4 to perform reproduction motion of fixed time, and track jump operation by turns to the reproduction means 2, and to perform a search operation. As shown in Step 30 of drawing 2, whenever it read the peak value 4 times, it constituted from this example so that a track jump might be carried out once.

[0022]The signal recorded on the disk 1 by the reproduction means 2 in reproduction motion is read, and as shown in Step 23, it changes into an audio signal by the signal processing means 41, and the peak value for every fixed time is detected and outputted. In the 1st peak value memory measure 5, since the big value to the 1st and the big value to the 2nd are memorized, if they are set to MX1 and MX2, it will update at Steps 27 and 29 of drawing 2, and will memorize to the 1st peak value memory measure 5. The minimum value is made to memorize among the reference values which the search operation control means 4 performs error generation detection, controls the peak value memory measure 7, and mentions later to the 1st peak value memory measure 5, as it is shown in Steps 24 and 25, when a search operation has an error at this time and a peak value is not able to be detected. Next, at Step 30, the number-of-times check of reading of a peak data value is performed, it returns to Step 23 and the above-mentioned processing is repeated until it reads 4 times, and it shifts to the processing after Step 31 from after 4 times reading. If the value equivalent to MX1

at the time of the reproduction motion before one and MX2 is memorized by the 2nd peak value memory measure 6 and they are set to MX3 and MX4, At Step 31 of drawing 2, the average value about MX1, MX2, MX3, and MX4 is computed by the peak mean value calculating means 8, and in Step 32 of drawing 3, MX1 of the 1st peak value memory measure 5 and MX2 are transmitted to MX3 of the 2nd peak value memory measure 6, and MX4, respectively, and they are memorized. Next, by Step 33, the value computed by the above-mentioned peak mean value calculating means 8 is compared with the value memorized by the maximum memory measure 9, and if the average value is larger, the value of the maximum memory measure 9 will be updated at Step 34. At Step 35, the search operation control means 4 performs track jump operation, and it moves to the following reproduction portions, and returns to Step 22, and the processing for the above-mentioned all-encompassing calculation is repeated.

[0023]After the end of a search operation distinguishes it at Step 36 of drawing 3, and it shifts from it to the judging process of the recording level of Step 37 and Step 39. Compare the reference value beforehand set to the value memorized by the maximum memory measure 9 here, operate the recording level discriminating means 17, and henceforth [Step 52] after that Namely, display processing of the recording level of the music signal of the disk 1, Setting out of the recording level by change of the digital magnitude of attenuation in the signal processing means 41 corresponding to the decision result of the recording level of a music signal and the contents of registration of the recording level registration means 44 and regeneration level setting out by change of the magnitude of attenuation of the electronic volume in the regeneration level setting-out means 43 are performed.

[0024]For example, when the reference value for recording level judgment is set to A0h and D0h and the contents of registration of the recording level registration means 44 are "NORMAL." While displaying a recording level "is common" at Step 52 between A0h and D0h, the magnitude of attenuation of the signal processing means 41 and the setting level of the regeneration level setting-out means 43 presuppose that it is the same as usual at Step 57, More than D0h, while displaying a recording level as "quantity" at Step 58, the magnitude of attenuation of 2 dB of the signal processing means 41 is decreased rather than usual at Step 64, It sets up make the setting level of the regeneration level setting-out means 43 increase by 2 dB, If smaller than A0h, while displaying a recording level as "low" at Step 59, the magnitude of attenuation of the signal processing means 41 is set up at Step 64 attenuate a setting level of 2 dB of the increase in 2 dB, and the regeneration level setting-out means 43 rather than usual.

[0025]not increasing, decreasing or changing the magnitude of attenuation of the signal processing means 41, and the magnitude of attenuation of the regeneration level setting-out means 43 like [also when the contents of registration of the recording level registration means 44 are except "NORMAL"] the above -- ***** -- it controls like.

[0026]As mentioned above, the digital audio signal, as for, level setting was carried out by the signal processing means 41 is changed into an analog signal by DA conversion means 11, and sound recording operation is performed by the recording means 45.

[0027]On the other hand, the music signal on the disk 1 heard as a sound by the loudspeaker 16, By being inputted into the regeneration level setting-out means 46 from the output of DA conversion means 11, and receiving amendment of the variation of regeneration level setting out which balances the variation of the digital magnitude of attenuation in the signal processing means 41 here, It is fixed to the volume which the user of apparatus wishes, and the music signal which received power amplification by the audio signal amplifying means 15 is inputted into the loudspeaker 16, and is outputted as a sound wave signal.

[0028]Concrete example computation is shown below. If it is (30 h, 8Dh, E0h, D8h), the 2nd time (A0h (= error), D0h, E8h, C0h), and the 3rd time (F0h, B8h, A8h, A0h) by the reproduction motion whose peak value detected by the signal processing means 41 is the 1st time, In the 1st reproduction motion, MX1=E0h and MX2=D8h are memorized by the 1st peak value memory measure 5, and also it is transmitted to the 2nd peak value memory measure 6 as MX3 and MX4, respectively. Next, in the 2nd reproduction motion that passed through the track jump, it is detected that signal reading had an error, the data which is A0h is compensated, and MX1=E8h and MX2=D0h are memorized as a result by the 1st peak value memory measure 5. At this time, since it is MX3=E0h and MX4=D8h, the average value by the result of an operation by the peak mean value calculating means 8 changes with DCh, it resembles the maximum memory measure 9, and that value is memorized. In the 3rd reproduction motion, although MX1=F0h, MX2=B8h, MX3=E8h, MX4=D0h, and its average are set to D8h and have the maximum of F0h, since average value becomes small rather than the time of the 2nd reproduction motion, the value of the maximum memory measure 9 is not updated. If the value memorized by

the maximum memory measure 9 at the time of the end of a high-speed search operation is DCh, since it is D0h<DCh, the conditions of Step 39 will serve as truth to the reference value D0h. Thereby, Step 58 or subsequent ones is performed.

[0029]The recording level registration means 44 "if the case where it is NORMAL] is assumed, It sets up the recording level setting-out means 43 control the signal processing means 41 by Step 64, and decrease digital signal outputs of 2 dB rather than a normal state, and for this reason, a music signal output of 2 dB of DA conversion means 11 is also decreased, and an audio signal of 2 dB recorded by the recording means 45 is also decreased. Can come, simultaneously the recording level setting-out means 43 controls the regeneration level setting-out means 46, make it increase 2 dB from a normal state, and the output to the audio signal amplifying means 15 the sound wave output level of the music signal from the loudspeaker 16, Even when the height of the recording level of the contents of registration of the recording level registration means 44 or the music signal on the disk 1 has a difference, it controls seemingly changeless.

[0030]Although the mechanical switch was considered as the composition registered by setting it as a certain position as a recording level registration means in the example of this invention, it is good also as composition of calculating and registering with a microcomputer etc. the number of times which a push-button switch pushes, and displaying the contents of registration on the displaying means of a liquid crystal display etc.

[0031]Although it had composition which sets up the magnitude of attenuation of a signal processing means and a regeneration level setting-out means in consideration of a recording level registration means and the recording level of the music signal on a disk in the example of this invention, It is good also as composition to which the magnitude of attenuation of a signal processing means and a regeneration level setting-out means is merely simply changed from a standard state only corresponding to the contents of registration of a recording level registration means without performing the high-speed search operation for checking the recording level of the music signal on a disk.

[0032]Although it had composition which performs the high-speed search operation for judging the recording level of the music signal on a disk, and sets up the magnitude of attenuation of a signal processing means and a regeneration level setting-out means according to the contents of registration of a recording level registration means immediately in the example of this invention, After carrying out a high-speed search, judging and displaying the recording level of the music signal on a disk and waiting registration ends registration by the user of a recording level registration means, the keystroke of a recording start Waiting, After there are recording start directions, it is good also as composition of setting the magnitude of attenuation of a signal processing means and a regeneration level setting-out means to the recording level of the music signal on a disk according to the contents of registration of a recording level registration means, and starting sound recording.

[0033]In the example of this invention, although the magnetic recording medium was used as a recording means, other recording media, such as a magneto-optical disc, may be used.

[0034]Although it had composition which displays the height of the recording level of the music signal on a disk on the displaying means of a liquid crystal display etc. by a recording level displaying means in the example of this invention, it is good also as composition of making a voice synthesis signal etc. pronounce with a display etc.

[0035]Although the magnitude of attenuation of a signal processing means and a regeneration level setting-out means had composition changed every 2 dB in the example of this invention, other values, such as carrying out every 3 dB, may be used. Regularity does not need to make it not necessarily change with the size of the recording level of the contents of the recording level registration means, or the music signal on a disk the amount of dB every. For example, in "HIGH" and "NORMAL", change of the magnitude of attenuation has the contents of registration of a recording level registration means good at 3 dB, "LOW", and "NORMAL" also as composition which change of the magnitude of attenuation controls like 2 dB etc.

[0036]

[Effect of the Invention]Recording level registration for switching the recording level at the time of recording to magnetic tape etc. from a disk to one of two or more steps by this invention according to a user's liking as mentioned above can be performed, While distinguishing and displaying the height of the recording level of the music signal currently recorded on the disk, The magnitude of attenuation in the electronic volume at the time of only the quantity corresponding to change of the magnitude of attenuation for the recording level change by a signal processing means outputting a music signal to a loudspeaker at the same time it switches a recording level with the digital attenuator of a signal processing means according to the discriminated result

and the contents of recording level registration of the recording level. It sets up by amending. Therefore, the recording level to magnetic tape etc. can be switched according to a user's liking, without producing change of the sound wave output level from a loudspeaker which produces sense of incongruity. Therefore, like the conventional disk reproduction device, circuit components, such as an analog attenuator, are not needed for the input of a recording means, and input/output terminals, such as a microcomputer for exclusive use for the control, are not needed, either.

[0037] Therefore, the highly efficient and cheap disk reproduction device which can switch a recording level to several steps according to a user's liking can be realized, and the effect is very a so-called size.

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TECHNICAL FIELD

[Industrial Application]This invention A mini component stereo device, CD radio cassette recorder tape recorder, etc., It is related with the disk reproduction device provided with the recording function for recording the music signal in recording media, such as a compact disk, to other recording media, such as a magnetic recording medium, and the reproduced sound output circuit for monitor sound listening at the time of sound recording.

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PRIOR ART

[Description of the Prior Art]In recent years, in the disk reproduction device, the function for setting up and recording the optimal recording level automatically in the case of the sound recording to a tape recorder (part) etc. is used.

[0003]An example of the conventional disk reproduction device mentioned above is explained referring to drawings below.

[0004]Drawing 5 is a block diagram showing the composition of an example of the conventional disk reproduction device. 1 in drawing 5 Disk shape recording media, such as CD (it is hereafter expressed as a disk.), An optical pickup for 2 to read the signal currently recorded on the disk 1, The reproduction means which consists of an optical pickup actuator, a servo circuit for drive controlling, etc., The signal processing means which 3 receives the signal from the signal reading means 2, and changes it into an audio signal, and detects the peak value for every fixed time of the, and outputs the value as an 8-bit digital signal, The search operation control means controlled to perform a high-speed search operation when 4 repeats the reproduction motion for every fixed time, and track jump operation by turns to the signal reading means 2, The 1st peak value memory measure that memorizes the peak value from the signal processing means [in / in 5 / the Nth reproduction motion of the above-mentioned high-speed search operation] 3, 6 is 2nd peak value memory measure that similarly memorizes the peak value in the reproduction motion of eye ** (N-1) watch, and can consider the case where it constitutes so that two values, the big peak value to the 1st as an example and the big peak value to the 2nd, may be memorized etc. The peak value storage control means which 7 detects the signal reading error at the time of reproduction motion, and controls the memory processing by the peak value memory measure 5 of the above 1st, The peak mean value calculating means which computes the average value of the numerical value 8 is remembered to be by the 1st peak value memory measure 5 and the 2nd peak value memory measure 6 for every time of reproduction motion, The maximum memory measure which 9 performs renewal of comparison for every time of reproduction motion, and memorizes the maximum of the average value by the peak mean value calculating means 8, A recording level setting-out means to perform level setting at the time of 10 recording the above-mentioned audio signal to a magnetic recording means etc. by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of the above-mentioned end of a high-speed search operation, It is a switch (it is hereafter expressed as a peak search start switch.) for the DA conversion means from which 11 changes the digital audio signal from the signal processing means 3 into an analog signal, and 12 to start the recording means of a tape recorder etc., and for 13 start the above-mentioned peak level search operation. Generally 14 is called volume control volume etc. by the sound volume setting means which constitutes the audio signal from DA conversion means 11 so that the user of apparatus can set up the listening loudness level of sound freely. The audio signal amplifying means to which 15 carries out power amplification of the audio signal from the regeneration level setting-out means 14 with a fixed amplification factor, The loudspeaker from which 16 changes the audio electrical signal from the audio signal amplifying means 15 into a sound wave, 17 is a recording level discriminating means which distinguishes the height of the recording level of the music signal currently recorded on the disk by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of said end of a high-speed search operation.

[0005]Drawing 6 and drawing 7 are the flow chart figures showing the contents of processing of each part shown in drawing 4. Hereafter, concrete operation of the conventional disk reproduction device is explained using drawing 5, drawing 6, and drawing 7.

[0006]If a peak search operation is started by turning on the peak search start switch 13, As shown in Steps

21 and 22 of drawing 6, the maximum memory measure 9, 1st, and 2nd peak value memory measure 5 and 6 is reset the first stage, and it controls for the search operation control means 4 to perform reproduction motion of fixed time, and track jump operation by turns to the reproduction means 2, and to perform a search operation. For example, as shown in Step 30 of drawing 6, whenever it reads a peak value 4 times, it is constituted so that a track jump may be carried out once.

[0007]The signal recorded on the disk 1 by the reproduction means 2 in reproduction motion is read, as shown in Step 23, it changes into an audio signal by the signal processing means 3, and the peak value for every fixed time is detected, and it outputs from the signal processing means 3. In the 1st peak value memory measure 5, since the big value to the 1st and the big value to the 2nd are memorized, if they are set to MX1 and MX2, it will update at Steps 27 and 29 of drawing 6, and will memorize to the 1st peak value memory measure 5. When a search operation has an error at this time and a peak value is not able to be detected, as it is shown in Steps 24 and 25, the minimum value is memorized among the reference values which perform error generation detection from the state of the search operation control means 4 by the peak value storage control means 7, and are later mentioned to the 1st peak value memory measure 5. Next, in Step 30, the number-of-times check of reading of a peak data value is performed, it returns to Step 23 and the above-mentioned processing is repeated until it reads 4 times, and it shifts to 31 or less-step processing from after 4 times reading. If the value equivalent to MX1 at the time of the reproduction motion before one and MX2 is memorized by the 2nd peak value memory measure 6 and they are set to MX3 and MX4, At Step 31 of drawing 6, the average value about MX1, MX2, MX3, and MX4 is computed by the peak mean value calculating means 8, and in Step 32, MX1 of the 1st peak value memory measure 5 and MX2 are transmitted to MX3 of the 2nd peak value memory measure 6, and MX4, respectively, and they are memorized. Next, by Step 33, the value computed by the above-mentioned peak mean value calculating means 8 is compared with the value memorized by the maximum memory measure 9, and if large, it will update at Step 34. At Step 35, if the search operation control means 4 performs track jump operation, it moves to the following reproduction portions and the search operation of the whole necessary part of the disk 1 is not completed, it returns from Step 36 to Step 22, and the processing for the above-mentioned all-encompassing calculation is repeated.

[0008]After the end of a search operation distinguishes it at Step 36, and shifts from Step 37 to processing of Step 40. That is, by the recording level setting-out means 10, comparison with the reference value beforehand set to the value memorized by the maximum memory measure 9 is performed, and a recording level is set up. For example, it is A0h (a hexadecimal number is expressed.) about a reference value. hereafter if the same D0h -- more than A0h -- the recording level of the input by the recording means 12 -- usual -- 3-dB attenuation and D -- 0h or more is set up like [usual] 6-dB attenuation.

[0009]As mentioned above, with the recording level set up by the recording level setting-out means 10, the audio signal of the signal processing means 3 is changed into an analog signal by DA conversion means 11, and sound recording operation is performed by the recording means 12.

[0010]On the other hand, the music signal on the disk 1 heard as a sound by the loudspeaker 16, It is inputted into the sound volume setting means 14 from the output of DA conversion means 11, and is set as the volume which the user of apparatus wishes here, and the music signal which received power amplification by the audio signal amplifying means 15 is inputted into the loudspeaker 16, and is outputted as a sound wave signal.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention]Recording level registration for switching the recording level at the time of recording to magnetic tape etc. from a disk to one of two or more steps by this invention according to a user's liking as mentioned above can be performed, While distinguishing and displaying the height of the recording level of the music signal currently recorded on the disk, The magnitude of attenuation in the electronic volume at the time of only the quantity corresponding to change of the magnitude of attenuation for the recording level change by a signal processing means outputting a music signal to a loudspeaker at the same time it switches a recording level with the digital attenuator of a signal processing means according to the discriminated result and the contents of recording level registration of the recording level. It sets up by amending. Therefore, the recording level to magnetic tape etc. can be switched according to a user's liking, without producing change of the sound wave output level from a loudspeaker which produces sense of incongruity. Therefore, like the conventional disk reproduction device, circuit components, such as an analog attenuator, are not needed for the input of a recording means, and input/output terminals, such as a microcomputer for exclusive use for the control, are not needed, either.

[0037]Therefore, the highly efficient and cheap disk reproduction device which can switch a recording level to several steps according to a user's liking can be realized, and the effect is very a so-called size.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, the above conventional disk reproduction devices, The analog attenuator circuit which comprises IC or the transistor which had to perform recording level setting out by the recording means of the latter part of a DA conversion means, outputted the signal from the output port of the microcomputer as a recording level setting-out means, and was provided in the input of the recording means, a resistor, etc. needed to be driven. For this reason, if it is going to make it switch the some steps recording level recorded to magnetic tape etc. according to a user's liking by a recording means, the output port of a microcomputer will be increased, Unless it enlarged the scale of the analog attenuator circuit, it could not realize, but there was a problem of being a serious high cost.

[0012]This invention takes an example by the above-mentioned conventional problem, It aims at providing the highly efficient and cheap disk reproduction device which can switch the recording level recorded to magnetic tape etc. without needing the analog attenuator circuit as a recording level setting-out means to several steps according to a user's liking.

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MEANS

[Means for Solving the Problem]In order to solve an aforementioned problem, a disk reproduction device of this invention is characterized by comprising the following:

A reproduction means which plays a music signal on a disk which is the first recording medium.

A recording means which records a reproduced output signal from said reproduction means to the second recording medium.

A recording level registration means which carries out level registration for switching manually a recording level which records a reproduced output signal from said reproduction means by said recording means to one of two or more steps.

A signal processing means which detects a peak value for every fixed time of a music signal recorded on a disk, and outputs the value with a digital signal, A search operation control means controlled to perform a high-speed search operation by repeating reproduction motion and track jump operation by turns, The 1st peak value memory measure that memorizes a peak value from said signal processing means in the Nth reproduction motion of said high-speed search operation, The 2nd peak value memory measure that memorizes a peak value from said signal processing means in reproduction motion of eye ** (N-1) watch, A peak value storage control means which detects a signal reading error at the time of reproduction motion, and controls memory processing of said 1st peak value memory measure, A peak mean value calculating means which computes average value of a numerical value memorized by said 1st peak value memory measure and the 2nd peak value memory measure for every time of reproduction motion, A maximum memory measure which performs renewal of comparison for every time of reproduction motion, and memorizes the maximum of average value by said peak mean value calculating means, A recording level discriminating means which distinguishes height of a recording level of a music signal currently recorded on a disk by comparison with a sound recording reference value beforehand set to the maximum memorized by maximum memory measure at the time of said end of a high-speed search operation, A recording level displaying means which displays the contents of an output of said recording level discriminating means, A recording level setting-out means which changes the magnitude of attenuation or amplification by the contents of an output of said recording level discriminating means, and the contents of registration of said recording level registration means, and switches a recording level, A regeneration level setting-out means to set up by amending the magnitude of attenuation at the time of only quantity corresponding to variation of the magnitude of attenuation which it was combined with said reproduction means and set up by said recording level setting-out means outputting said music signal to a loudspeaker etc.

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OPERATION

[Function]This invention can perform recording level registration for switching the recording level at the time of recording to magnetic tape etc. from a disk to one of two or more steps by the above-mentioned composition according to a user's liking, While distinguishing and displaying the height of the recording level of the music signal currently recorded on the disk, The magnitude of attenuation in the electronic volume at the time of only the quantity corresponding to change of the magnitude of attenuation for the recording level change by a signal processing means outputting a music signal to a loudspeaker at the same time it switches a recording level with the digital attenuator of a signal processing means according to the discriminated result and the contents of recording level registration of the recording level. Since it sets up by amending, the highly efficient and cheap disk reproduction device which can switch a recording level to several steps according to a user's liking without needing an analog attenuator circuit is realizable.

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EXAMPLE

[Example]Hereafter, the disk reproduction device of one example of this invention is explained in detail, referring to drawing 1 – drawing 4. Drawing 5 – the number same about the same component part as drawing 7 are given, and explanation is omitted.

[0016]Drawing 1 is a block diagram showing the composition of the disk reproduction device in the example of this invention.

[0017]In drawing 1, at the same time 41 receives the signal from the signal reading means 2, detects the peak value for every fixed time of the and outputs the value as an 8-bit digital signal, The signal processing means provided with the composition which attenuates the above-mentioned audio signal in digital one, and can output the control signal from a recording level setting-out means 43 to mention later while changing the signal into an audio signal by publicly known digital signal processing technology, by the arithmetic processing circuit inside a receptacle, The recording level displaying means as which 42 displays the recording level of the music signal on a disk on a liquid crystal display etc. according to the contents of an output of the recording level discriminating means 17, 43 by comparison with the reference value beforehand set to the maximum memorized by the maximum memory measure 9 at the time of the above-mentioned end of a high-speed search operation. The recording level setting-out means which controls a regeneration level setting-out means 46 to output the control signal for level setting at the time of recording the above-mentioned audio signal by the recording means 45 mentioned later, such as a magnetic recording means, to the signal processing means 41, and to mention later, A recording level registration means to set up level registration for 44 to switch manually the level which records the reproduced output signal from the reproduction means 2 by the recording means 45 to one of of two or more steps with the position change of a mechanical switch, etc., The recording means of composition of performing sound recording operation with fixed amplification without 45 having an analog attenuator circuit which comprises an IC or a transistor, a resistor, etc. unlike the disk reproduction device of a conventional example to the input, Although 46 is the regeneration level setting-out means constituted in the audio signal from DA conversion means 11 so that the user of apparatus could set up the listening level freely and is generally called volume control volume etc., It is called the electronic volume also having the function which can fluctuate the magnitude of attenuation or the amplifying amount of an audio signal with the control signal from the recording level setting-out means 43 in this example, etc.

[0018]Drawing 2 – drawing 4 are the flow chart figures showing the contents of processing of each part shown in drawing 1. About the disk reproduction device constituted as mentioned above, the operation is explained below.

[0019]The recording level registration means 44 first assumes that the stage of height switched the position of the mechanical switch manually, and has registered the recording level which a user wants to record from the inside of those with a three-stage, "HIGH", "NORMAL", and "LOW." The contents of registration of this recording level registration means 44 can detect that setting-out position by reading the terminal voltage of a mechanical switch with a microcomputer.

[0020]If a peak search operation is started by turning on the peak search start switch 13, As shown in Steps 51 and 22 of drawing 2, the peak mean value calculating means 8, 1st, and 2nd peak value memory measure 5 and 6 is reset the first stage, and the digital magnitude of attenuation of the signal processing means 41 is set as a standard value of -4dB. Setting the digital magnitude of attenuation of the signal processing means 41 as -4 dB instead of 0 dB here cannot be amplified by the signal processing means 41, but it is only decreasing, It is because it is necessary to make the digital magnitude of attenuation smaller than a normal condition depending on the contents of registration of the recording level of the disk 1, or the recording level

registration means 44, and to enlarge a recording level.

[0021]Next, it controls for the search operation control means 4 to perform reproduction motion of fixed time, and track jump operation by turns to the reproduction means 2, and to perform a search operation. As shown in Step 30 of drawing 2, whenever it read the peak value 4 times, it constituted from this example so that a track jump might be carried out once.

[0022]The signal recorded on the disk 1 by the reproduction means 2 in reproduction motion is read, and as shown in Step 23, it changes into an audio signal by the signal processing means 41, and the peak value for every fixed time is detected and outputted. In the 1st peak value memory measure 5, since the big value to the 1st and the big value to the 2nd are memorized, if they are set to MX1 and MX2, it will update at Steps 27 and 29 of drawing 2, and will memorize to the 1st peak value memory measure 5. The minimum value is made to memorize among the reference values which the search operation control means 4 performs error generation detection, controls the peak value memory measure 7, and mentions later to the 1st peak value memory measure 5, as it is shown in Steps 24 and 25, when a search operation has an error at this time and a peak value is not able to be detected. Next, at Step 30, the number-of-times check of reading of a peak data value is performed, it returns to Step 23 and the above-mentioned processing is repeated until it reads 4 times, and it shifts to the processing after Step 31 from after 4 times reading. If the value equivalent to MX1 at the time of the reproduction motion before one and MX2 is memorized by the 2nd peak value memory measure 6 and they are set to MX3 and MX4, At Step 31 of drawing 2, the average value about MX1, MX2, MX3, and MX4 is computed by the peak mean value calculating means 8, and in Step 32 of drawing 3, MX1 of the 1st peak value memory measure 5 and MX2 are transmitted to MX3 of the 2nd peak value memory measure 6, and MX4, respectively, and they are memorized. Next, by Step 33, the value computed by the above-mentioned peak mean value calculating means 8 is compared with the value memorized by the maximum memory measure 9, and if the average value is larger, the value of the maximum memory measure 9 will be updated at Step 34. At Step 35, the search operation control means 4 performs track jump operation, and it moves to the following reproduction portions, and returns to Step 22, and the processing for the above-mentioned all-encompassing calculation is repeated.

[0023]After the end of a search operation distinguishes it at Step 36 of drawing 3, and it shifts from it to the judging process of the recording level of Step 37 and Step 39. Compare the reference value beforehand set to the value memorized by the maximum memory measure 9 here, operate the recording level discriminating means 17, and henceforth [Step 52] after that Namely, display processing of the recording level of the music signal of the disk 1, Setting out of the recording level by change of the digital magnitude of attenuation in the signal processing means 41 corresponding to the decision result of the recording level of a music signal and the contents of registration of the recording level registration means 44 and regeneration level setting out by change of the magnitude of attenuation of the electronic volume in the regeneration level setting-out means 43 are performed.

[0024]For example, when the reference value for recording level judgment is set to A0h and D0h and the contents of registration of the recording level registration means 44 are "NORMAL." While displaying a recording level "is common" at Step 52 between A0h and D0h, the magnitude of attenuation of the signal processing means 41 and the setting level of the regeneration level setting-out means 43 presuppose that it is the same as usual at Step 57, More than D0h, while displaying a recording level as "quantity" at Step 58, the magnitude of attenuation of 2 dB of the signal processing means 41 is decreased rather than usual at Step 64, It sets up make the setting level of the regeneration level setting-out means 43 increase by 2 dB, If smaller than A0h, while displaying a recording level as "low" at Step 59, the magnitude of attenuation of the signal processing means 41 is set up at Step 64 attenuate a setting level of 2 dB of the increase in 2 dB, and the regeneration level setting-out means 43 rather than usual.

[0025]not increasing, decreasing or changing the magnitude of attenuation of the signal processing means 41, and the magnitude of attenuation of the regeneration level setting-out means 43 like [also when the contents of registration of the recording level registration means 44 are except "NORMAL"] the above -- ***** -- it controls like.

[0026]As mentioned above, the digital audio signal, as for, level setting was carried out by the signal processing means 41 is changed into an analog signal by DA conversion means 11, and sound recording operation is performed by the recording means 45.

[0027]On the other hand, the music signal on the disk 1 heard as a sound by the loudspeaker 16, By being inputted into the regeneration level setting-out means 46 from the output of DA conversion means 11, and

receiving amendment of the variation of regeneration level setting out which balances the variation of the digital magnitude of attenuation in the signal processing means 41 here, It is fixed to the volume which the user of apparatus wishes, and the music signal which received power amplification by the audio signal amplifying means 15 is inputted into the loudspeaker 16, and is outputted as a sound wave signal.

[0028]Concrete example computation is shown below. If it is (30 h, 8Dh, E0h, D8h), the 2nd time (A0h (= error), D0h, E8h, C0h), and the 3rd time (F0h, B8h, A8h, A0h) by the reproduction motion whose peak value detected by the signal processing means 41 is the 1st time, In the 1st reproduction motion, MX1=E0h and MX2=D8h are memorized by the 1st peak value memory measure 5, and also it is transmitted to the 2nd peak value memory measure 6 as MX3 and MX4, respectively. Next, in the 2nd reproduction motion that passed through the track jump, it is detected that signal reading had an error, the data which is A0h is compensated, and MX1=E8h and MX2=D0h are memorized as a result by the 1st peak value memory measure 5. At this time, since it is MX3=E0h and MX4=D8h, the average value by the result of an operation by the peak mean value calculating means 8 changes with DCh, it resembles the maximum memory measure 9, and that value is memorized. In the 3rd reproduction motion, although MX1=F0h, MX2=B8h, MX3=E8h, MX4=D0h, and its average are set to D8h and have the maximum of F0h, since average value becomes small rather than the time of the 2nd reproduction motion, the value of the maximum memory measure 9 is not updated. If the value memorized by the maximum memory measure 9 at the time of the end of a high-speed search operation is DCh, since it is D0h<DCh, the conditions of Step 39 will serve as truth to the reference value D0h. Thereby, Step 58 or subsequent ones is performed.

[0029]The recording level registration means 44 "if the case where it is NORMAL] is assumed, It sets up the recording level setting-out means 43 control the signal processing means 41 by Step 64, and decrease digital signal outputs of 2 dB rather than a normal state, and for this reason, a music signal output of 2 dB of DA conversion means 11 is also decreased, and an audio signal of 2 dB recorded by the recording means 45 is also decreased. Can come, simultaneously the recording level setting-out means 43 controls the regeneration level setting-out means 46, make it increase 2 dB from a normal state, and the output to the audio signal amplifying means 15 the sound wave output level of the music signal from the loudspeaker 16, Even when the height of the recording level of the contents of registration of the recording level registration means 44 or the music signal on the disk 1 has a difference, it controls seemingly changeless.

[0030]Although the mechanical switch was considered as the composition registered by setting it as a certain position as a recording level registration means in the example of this invention, it is good also as composition of calculating and registering with a microcomputer etc. the number of times which a push-button switch pushes, and displaying the contents of registration on the displaying means of a liquid crystal display etc.

[0031]Although it had composition which sets up the magnitude of attenuation of a signal processing means and a regeneration level setting-out means in consideration of a recording level registration means and the recording level of the music signal on a disk in the example of this invention, It is good also as composition to which the magnitude of attenuation of a signal processing means and a regeneration level setting-out means is merely simply changed from a standard state only corresponding to the contents of registration of a recording level registration means without performing the high-speed search operation for checking the recording level of the music signal on a disk.

[0032]Although it had composition which performs the high-speed search operation for judging the recording level of the music signal on a disk, and sets up the magnitude of attenuation of a signal processing means and a regeneration level setting-out means according to the contents of registration of a recording level registration means immediately in the example of this invention, After carrying out a high-speed search, judging and displaying the recording level of the music signal on a disk and waiting registration ends registration by the user of a recording level registration means, the keystroke of a recording start Waiting, After there are recording start directions, it is good also as composition of setting the magnitude of attenuation of a signal processing means and a regeneration level setting-out means to the recording level of the music signal on a disk according to the contents of registration of a recording level registration means, and starting sound recording.

[0033]In the example of this invention, although the magnetic recording medium was used as a recording means, other recording media, such as a magneto-optical disc, may be used.

[0034]Although it had composition which displays the height of the recording level of the music signal on a disk on the displaying means of a liquid crystal display etc. by a recording level displaying means in the example of this invention, it is good also as composition of making a voice synthesis signal etc. pronounce with

a display etc.

[0035]Although the magnitude of attenuation of a signal processing means and a regeneration level setting-out means had composition changed every 2 dB in the example of this invention, other values, such as carrying out every 3 dB, may be used. Regularity does not need to make it not necessarily change with the size of the recording level of the contents of the recording level registration means, or the music signal on a disk the amount of dB every. For example, in "HIGH" and "NORMAL", change of the magnitude of attenuation has the contents of registration of a recording level registration means good at 3 dB, "LOW", and "NORMAL" also as composition which change of the magnitude of attenuation controls like 2 dB etc.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The block diagram showing the composition of the disk reproduction device in the example of this invention

[Drawing 2]The flow chart of the disk reproduction device in the example of this invention

[Drawing 3]The flow chart of the disk reproduction device in the example of this invention

[Drawing 4]The flow chart of the disk reproduction device in the example of this invention

[Drawing 5]The block diagram showing the composition of the conventional disk reproduction device

[Drawing 6]The flow chart of the conventional disk reproduction device

[Drawing 7]The flow chart of the conventional disk reproduction device

[Description of Notations]

1 Disk

2 Reproduction means

4 Search operation control means

7 Peak value storage control means

8 Peak mean value calculating means

9 Maximum memory measure

17 Recording level discriminating means

41 Signal processing means

42 Recording level displaying means

44 Recording level registration means

43 Recording level setting-out means

45 Recording means

46 Regeneration level setting-out means

[Translation done.]

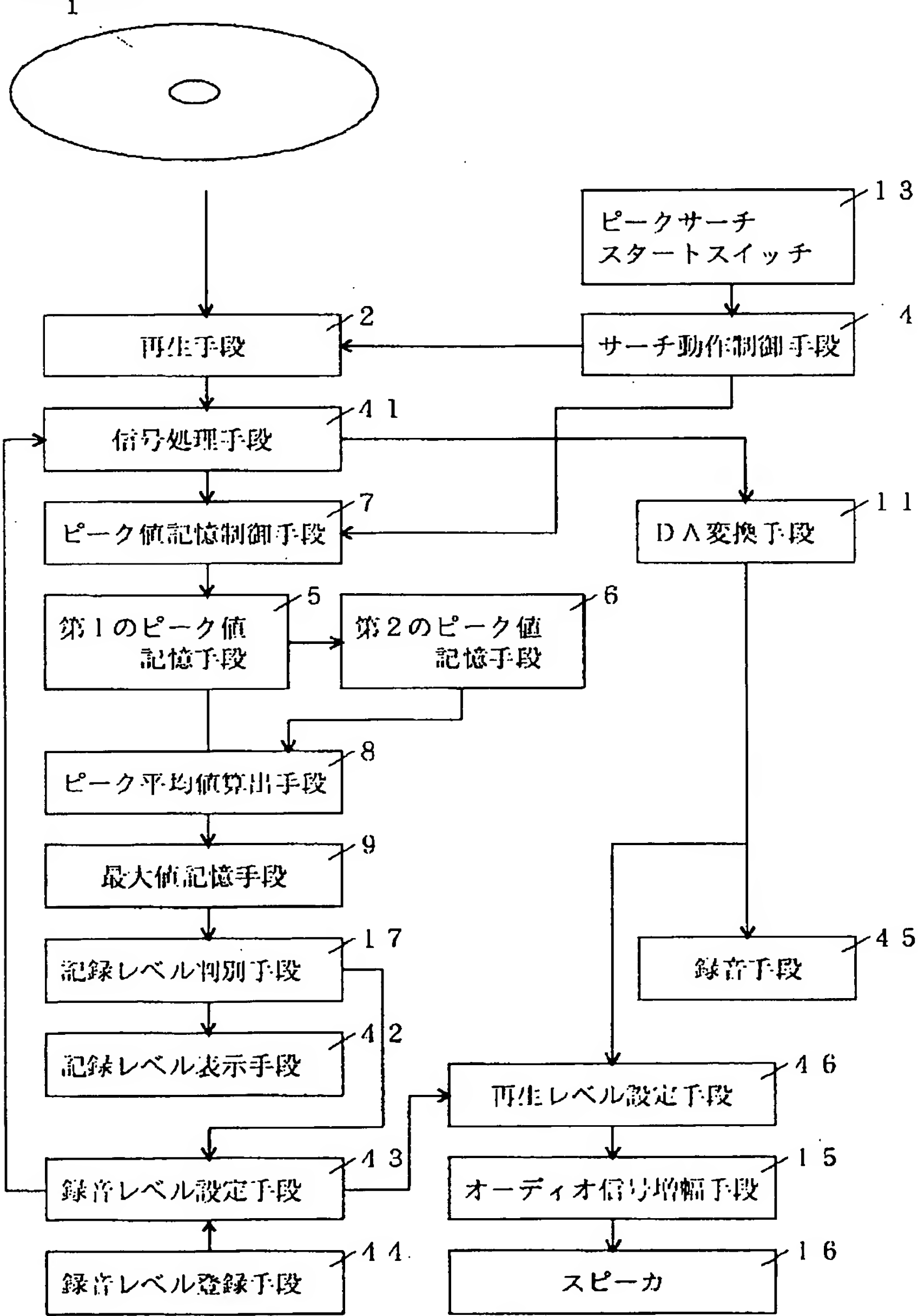
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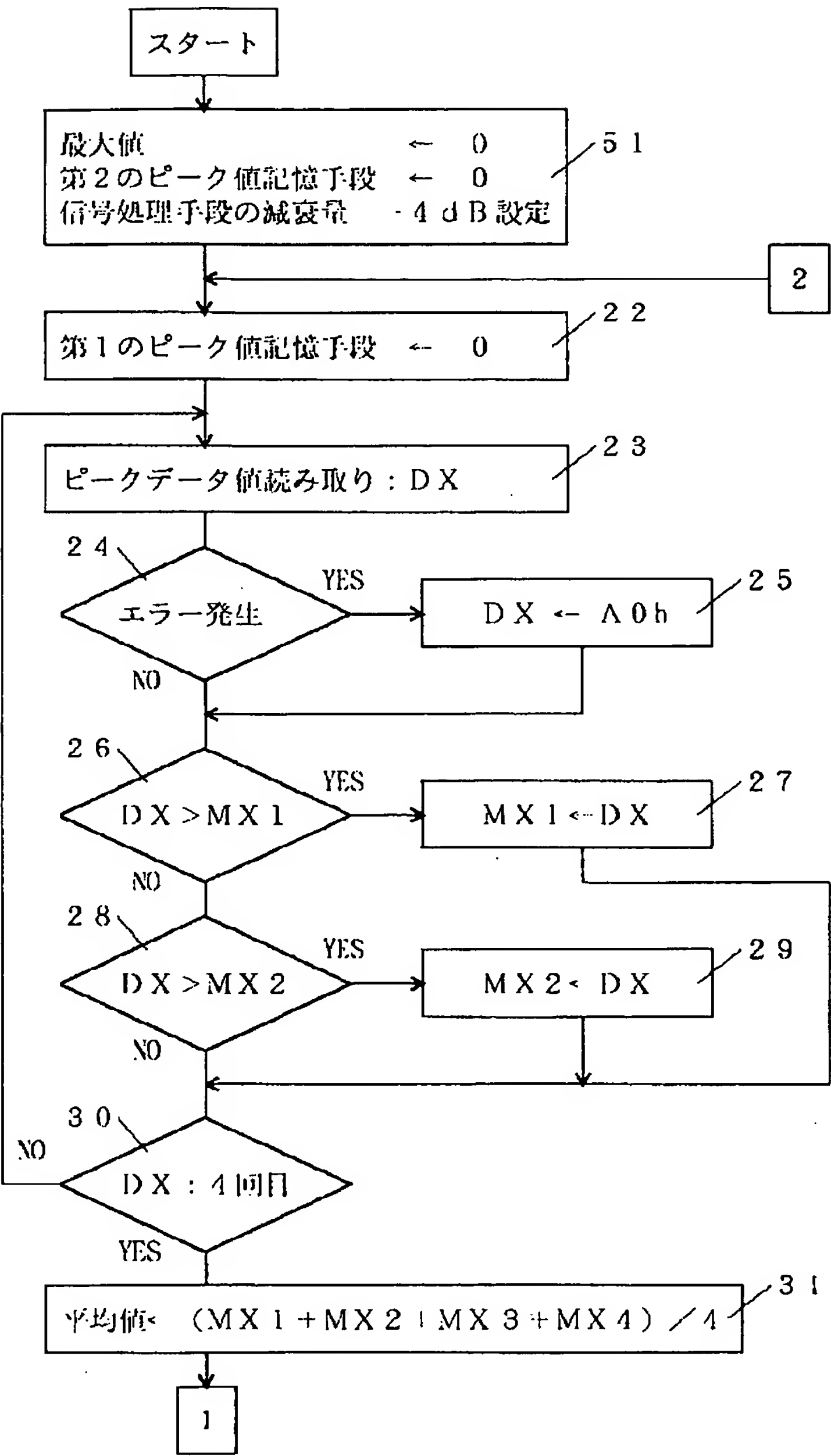
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DRAWINGS

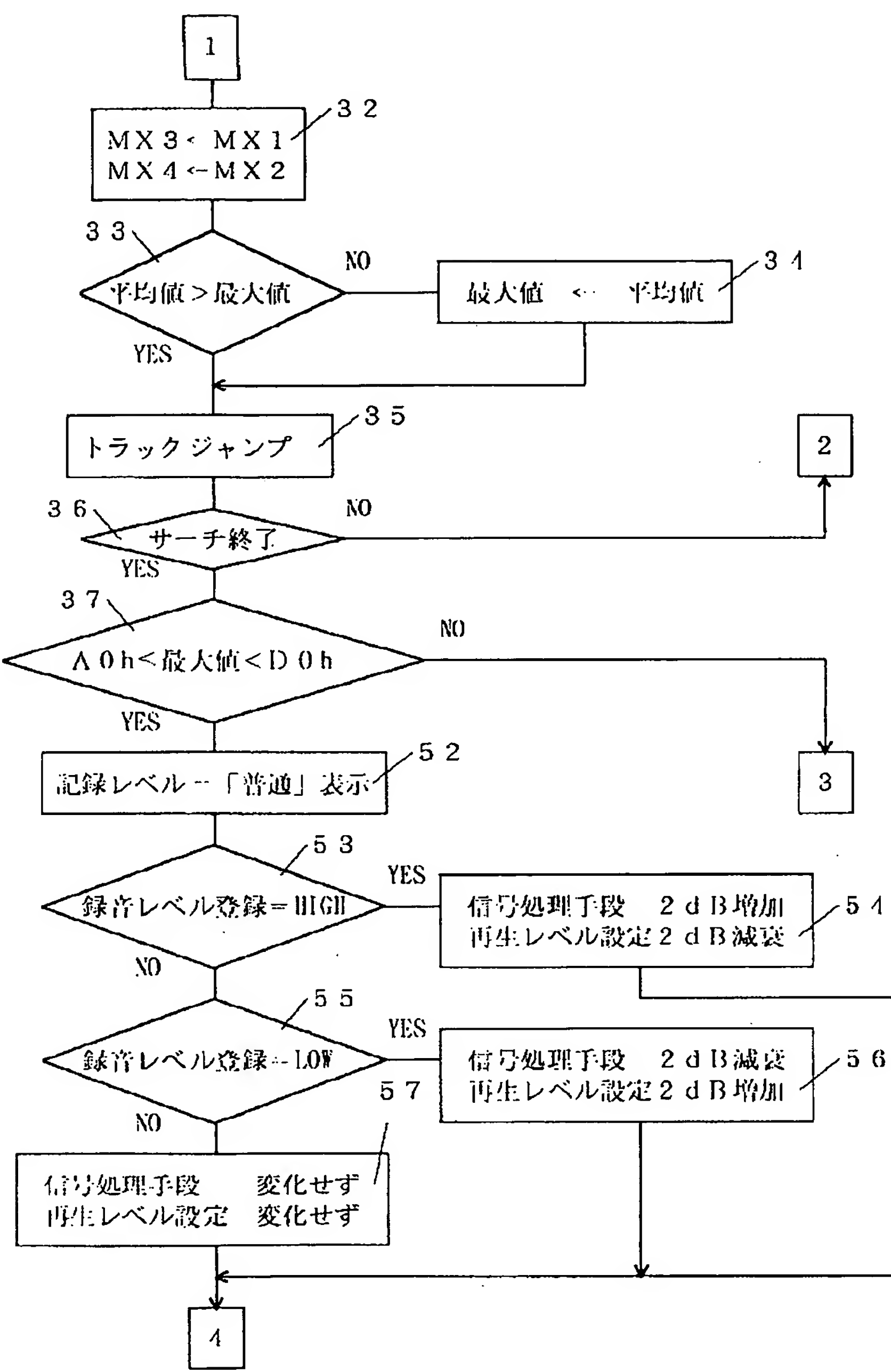
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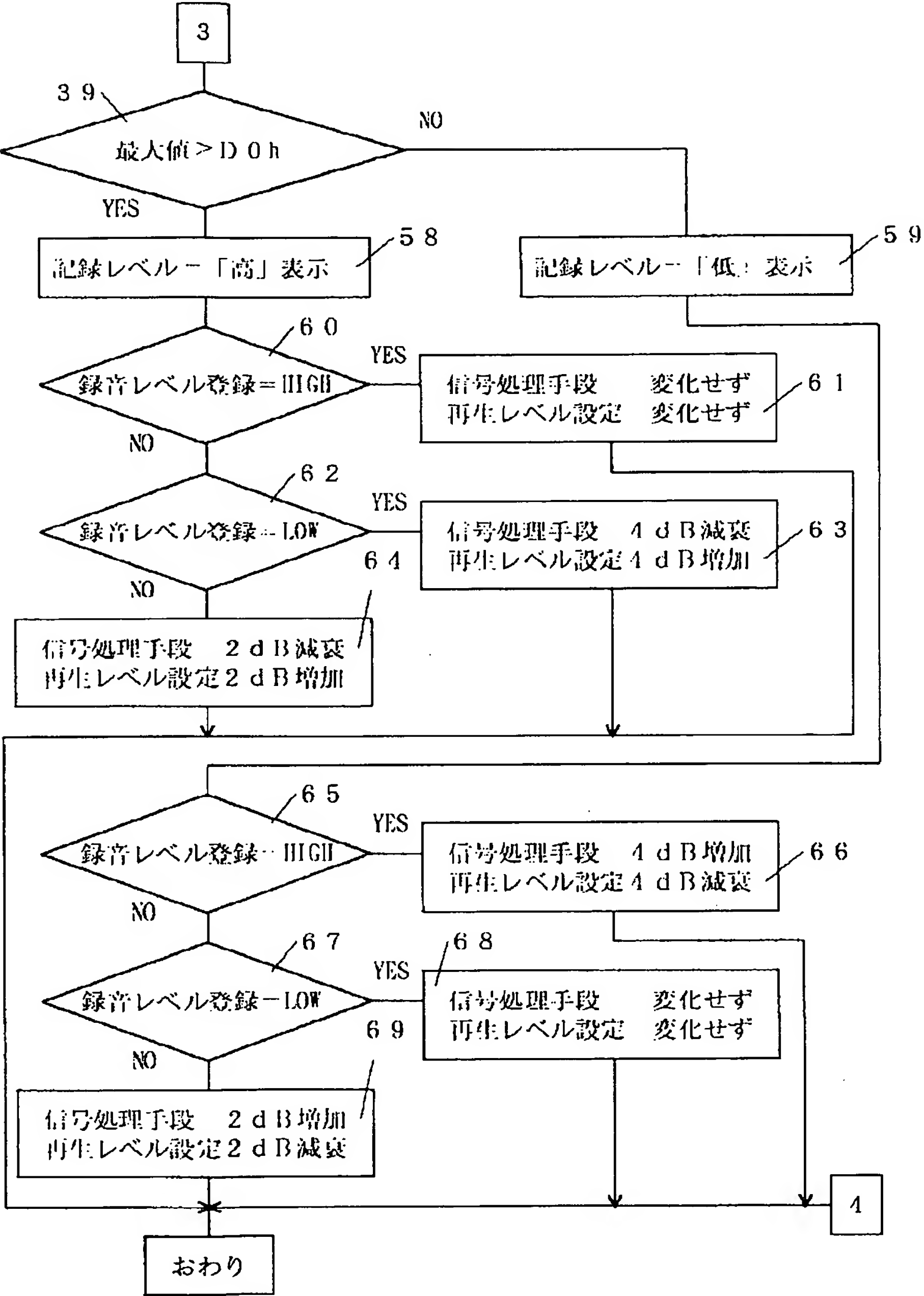
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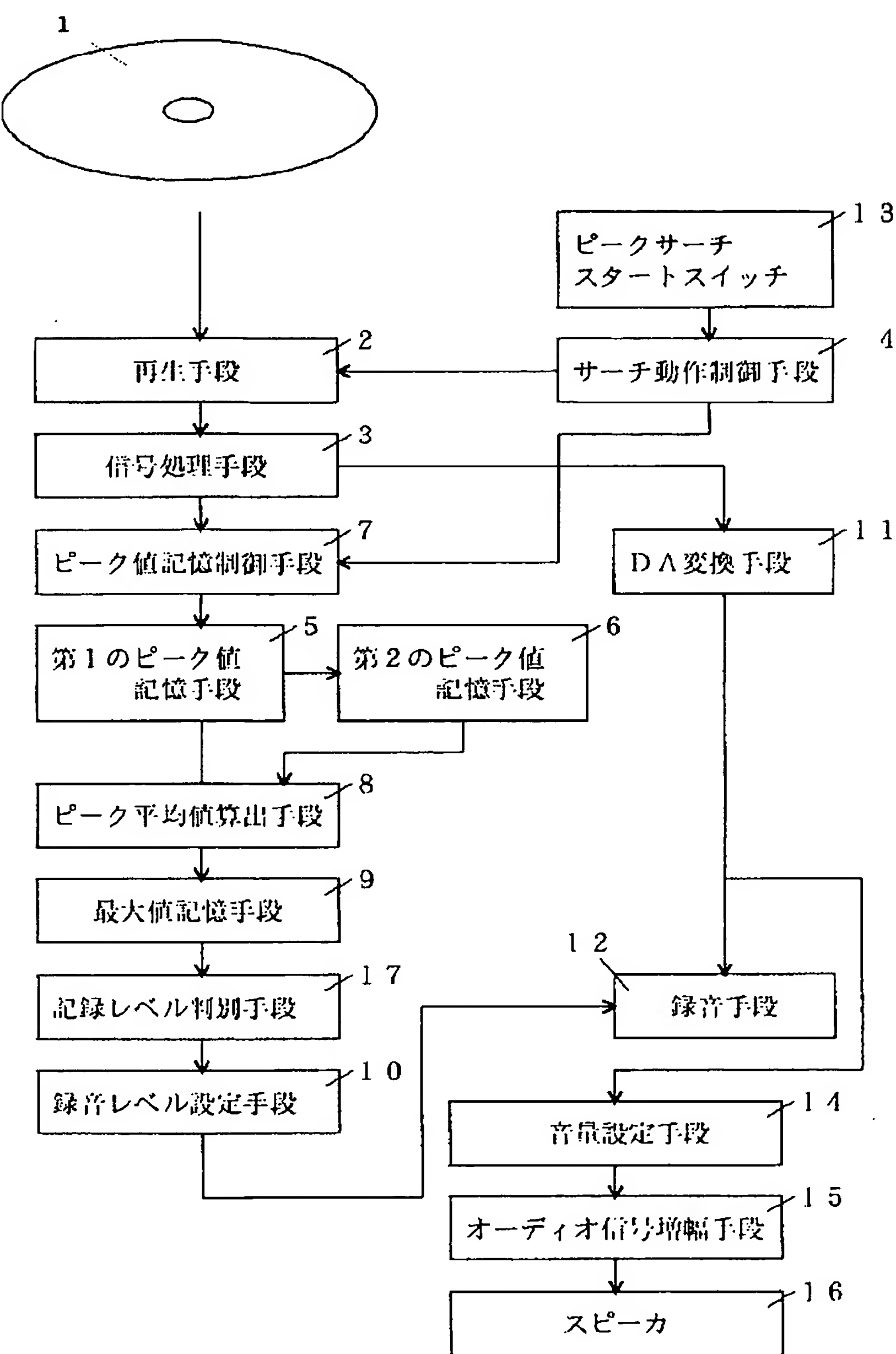
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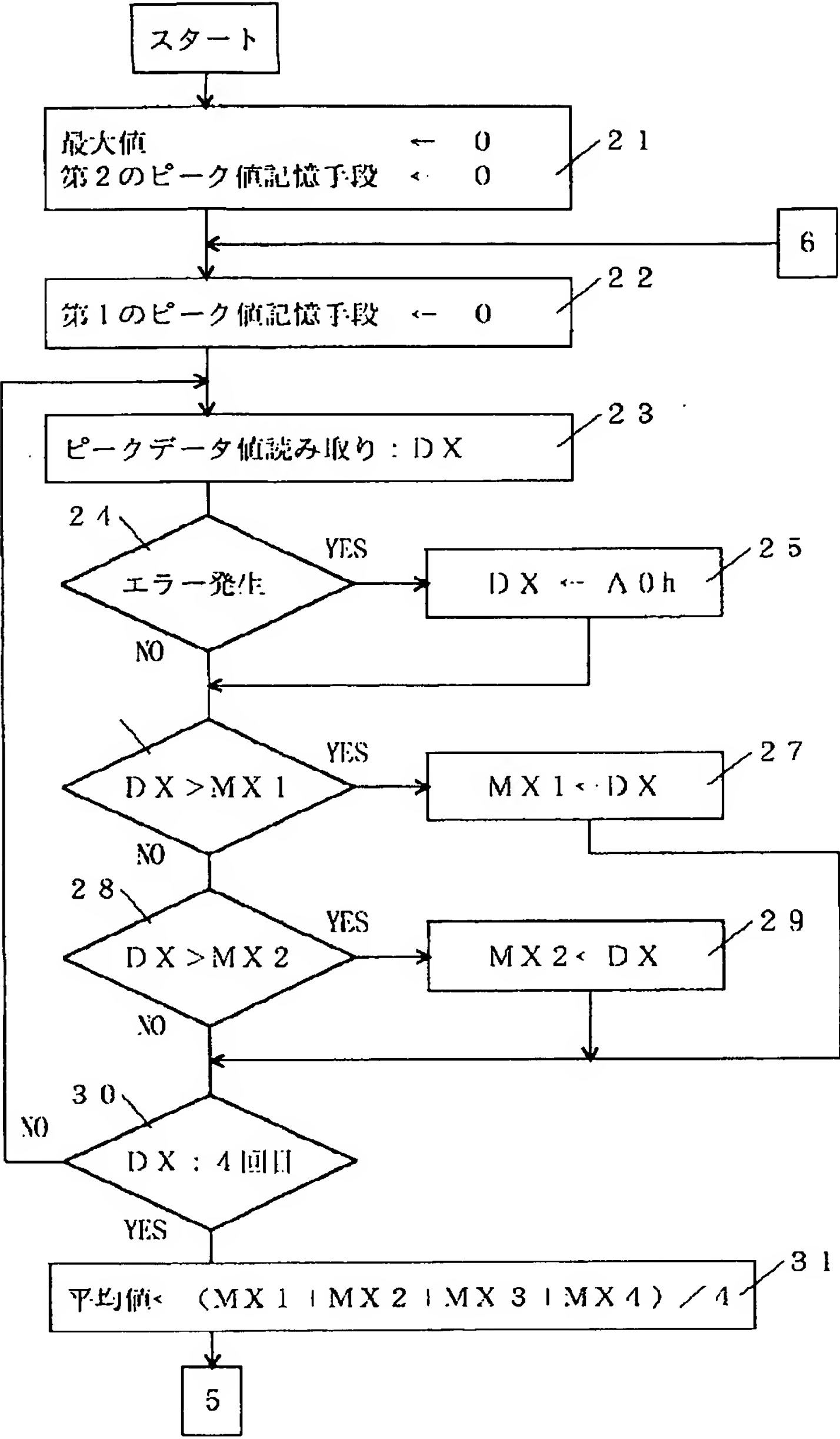
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Drawing 7]

1-4

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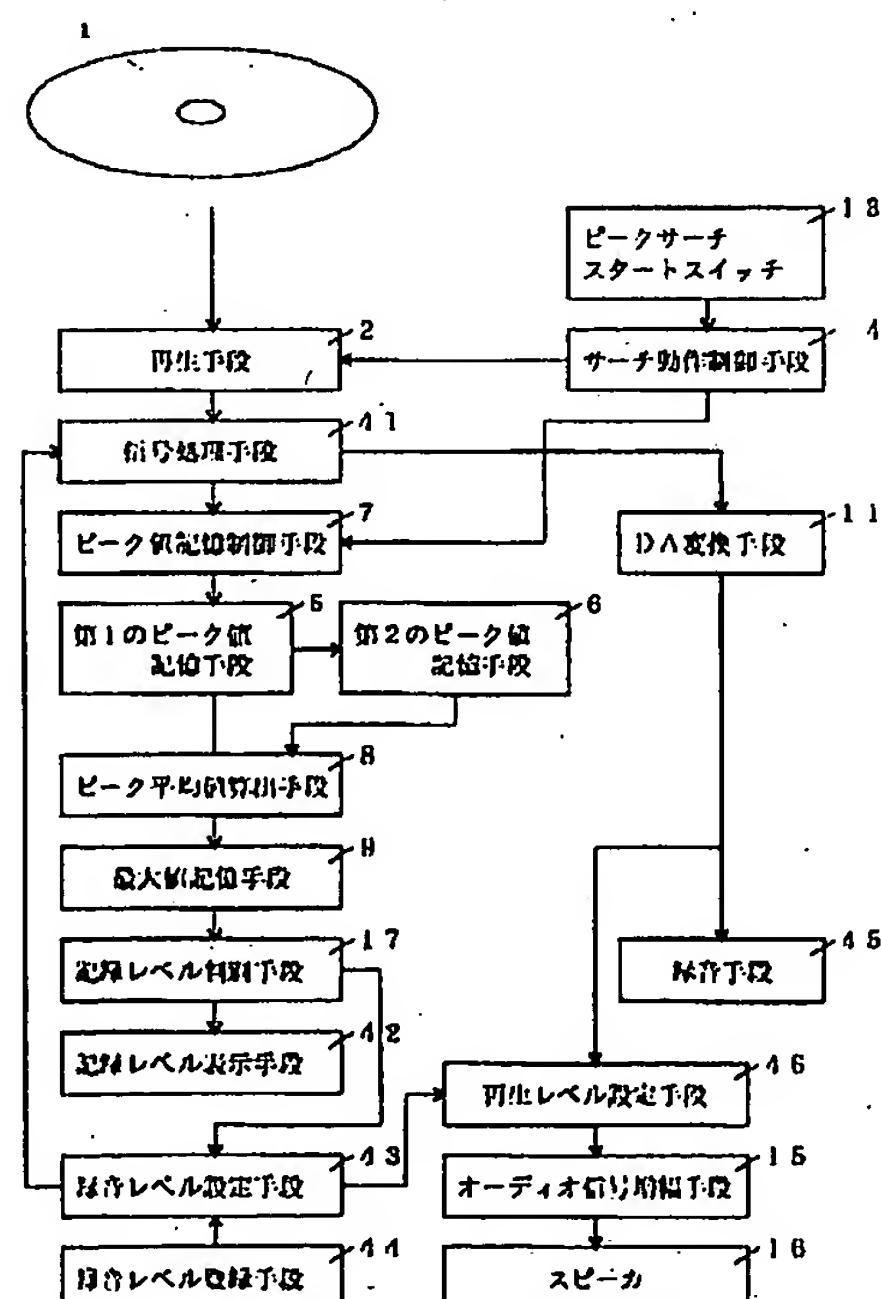
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(54)【発明の名称】 ディスク再生装置

(57)【要約】

【目的】 ディスク上の音楽信号の記録レベルの高低を判別し表示するとともに、ディスクから磁気テープなどへ録音するレベルをユーザーの好みに応じて何段階かに切り換えることのできる高機能で安価なディスク再生装置を提供することを目的とする。

【構成】 ディスク1に記録されている音楽信号の記録レベルの高低を判別し、記録レベルの判別手段17の結果と録音レベル登録手段44の登録内容とに応じて信号処理手段41内のデジタル減衰器で録音レベルを切り換えると同時に、信号処理手段41での録音レベル切換のための減衰量の変化に対応する量だけ音楽信号をスピーカへ出力するための増幅度を設定する再生レベル設定手段での減衰量を補正させる。



【特許請求の範囲】

【請求項1】 第一の記録媒体であるディスク上の音楽信号を再生する再生手段と、前記再生手段からの再生出力信号を第二の記録媒体に録音する録音手段と、前記再生手段からの再生出力信号を前記録音手段により録音する録音レベルを手動で複数段階のうちの一つに切り換えるためのレベル登録をする録音レベル登録手段と、前記録音レベル登録手段の登録内容で減衰量または増幅度を変化して録音レベルを切り換える録音レベル設定手段と、前記再生手段と結合され前記録音レベル設定手段で設定した減衰量の変化量に対応する量だけ前記音楽信号をスピーカ等へ出力するための増幅度を補正して設定を行う再生レベル設定手段とを備えたことを特徴とするディスク再生装置。

【請求項2】 ディスク上に記録された音楽信号の一定時間毎のピーク値を検出しその値をデジタル信号で出力する信号処理手段と、再生動作とトラックジャンプ動作を交互に繰り返すことにより高速サーチ動作を行うよう制御するサーチ動作制御手段と、前記高速サーチ動作の第N番目の再生動作における前記信号処理手段からのピーク値を記憶する第1のピーク値記憶手段と、第(N-1)番目の再生動作における前記信号処理手段からのピーク値を記憶する第2のピーク値記憶手段と、再生動作時の信号読み取りエラーを検出し前記第1のピーク値記憶手段の記憶処理を制御するピーク値記憶制御手段と、再生動作時毎に前記第1のピーク値記憶手段と第2のピーク値記憶手段に記憶されている数値の平均値を算出するピーク平均値算出手段と、再生動作時毎に比較更新を行い前記ピーク平均値算出手段による平均値の最大値を記憶する最大値記憶手段と、前記高速サーチ動作終了時に最大値記憶手段に記憶されている最大値と予め設定された録音基準値との比較によりディスク上に記録されている音楽信号の記録レベルの高低を判別する記録レベル判別手段と、前記記録レベル判別手段の出力内容を表示する記録レベル表示手段とを備えたことを特徴とする請求項1記載のディスク再生装置。

【請求項3】 前記記録レベル判別手段の出力内容と前記録音レベル登録手段の登録内容とで減衰量または増幅度を変化して録音レベルを切り換える録音レベル設定手段と、前記再生手段と結合され前記録音レベル設定手段で設定した減衰量の変化量に対応する量だけ前記音楽信号をスピーカ等へ出力するための増幅度を補正して設定を行う再生レベル設定手段とを備えたことを特徴とする請求項2記載のディスク再生装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、ミニコンポーネントステレオ装置やCDラジオカセットテープレコーダ等、コンパクトディスクなどの記録媒体内の音楽信号を磁気記録媒体など他の記録媒体に録音するための録音機能と録

音時のモニター音聴取のための再生音出力回路とを備えたディスク再生装置に関するものである。

【0002】

【従来の技術】 近年、ディスク再生装置ではテープレコーダ(部)等への録音の際に、自動的に最適の録音レベルを設定して録音するための機能が使用されている。

【0003】 以下図面を参照しながら、上述した従来のディスク再生装置の一例について説明する。

【0004】 図5は従来のディスク再生装置の一例の構成を示すブロック図である。図5において、1はCDなどのディスク状記録媒体(以下、ディスクと表現する。)、2はディスク1上に記録されている信号を読み取るための光ピックアップ、光ピックアップ駆動部、駆動制御用サーボ回路などからなる再生手段、3は信号読み取り手段2からの信号を受けオーディオ信号に変換すると共にその一定時間毎のピーク値を検出しその値を8ビットのデジタル信号として出力する信号処理手段、4は信号読み取り手段2に対して一定時間毎の再生動作とトラックジャンプ動作を交互に繰り返すことにより高速サーチ動作を行うよう制御するサーチ動作制御手段、5は上記高速サーチ動作の第N番目の再生動作における信号処理手段3からのピーク値を記憶する第1のピーク値記憶手段、6は同じく第(N-1)番目の再生動作におけるピーク値を記憶する第2のピーク値記憶手段であり、一例としては1番目に大きなピーク値と2番目に大きなピーク値の2つの値を記憶するように構成している場合などが考えられる。7は再生動作時の信号読み取りエラーを検出し上記第1のピーク値記憶手段5による記憶処理を制御するピーク値記憶制御手段、8は再生動作時毎に第1のピーク値記憶手段5と第2のピーク値記憶手段6に記憶されている数値の平均値を算出するピーク平均値算出手段、9は再生動作時毎に比較更新を行い、ピーク平均値算出手段8による平均値の最大値を記憶する最大値記憶手段、10は上記高速サーチ動作終了時に最大値記憶手段9に記憶されている最大値と予め設定された基準値との比較により上記オーディオ信号を磁気記録手段等へ録音する際のレベル設定を行う録音レベル設定手段、11は信号処理手段3からのデジタルオーディオ信号をアナログ信号に変換するDA変換手段、12はテープレコーダなどの録音手段、13は上記ピークレベルサーチ動作を開始するためのスイッチ(以下、ピークサーチスタートスイッチと表現する。)である。14はDA変換手段11からのオーディオ信号を機器の使用者が自由にその聴取音量レベルを設定できるように構成する音量設定手段で一般には音量調整ボリュームなどと呼ばれている。15は再生レベル設定手段14からのオーディオ信号を一定の増幅率で電力増幅するオーディオ信号増幅手段、16はオーディオ信号増幅手段15からのオーディオ電気信号を音波に変換するスピーカ、17は前記高速サーチ動作終了時に最大値記憶手段9に記憶さ

れている最大値と予め設定された基準値との比較によりディスク上に記録されている音楽信号の記録レベルの高低を判別する記録レベル判別手段である。

【0005】図6、図7は図4に示した各部の処理内容を示すフローチャート図である。以下、図5、図6及び図7を用いて従来のディスク再生装置の具体的動作について説明する。

【0006】ピークサーチスタートスイッチ13をONする事によりピークサーチ動作を開始すると、図6のステップ21、22に示すように最大値記憶手段9、第1、第2のピーク値記憶手段5、6を初期リセットし、サーチ動作制御手段4により再生手段2に対して一定時間の再生動作とトラックジャンプ動作を交互に行いサーチ動作を行うよう制御する。例えば図6のステップ30に示すようにピーク値を4回読みとる毎に1回トラックジャンプするよう構成される。

【0007】再生動作においては再生手段2によりディスク1に記録された信号を読み取り、ステップ23に示すように信号処理手段3によりオーディオ信号に変換すると共に一定時間毎のピーク値を検出し信号処理手段3から出力する。第1のピーク値記憶手段5では1番目に大きな値と2番目に大きな値とを記憶するのでそれらをMX1、MX2とすると、図6のステップ27、29で更新し第1のピーク値記憶手段5に記憶する。この時サーチ動作にエラーがありピーク値が検出できなかった場合にはステップ24、25に示すように、ピーク値記憶制御手段7によりサーチ動作制御手段4の状態からエラー発生検知を行い第1のピーク値記憶手段5に後述する基準値のうち最小の値を記憶する。次にステップ30では、ピークデータ値の読み取り回数チェックを行い、4回読み取るまではステップ23へ戻って上記処理を繰り返す。4回読み取り後はステップ31以下の処理に移る。第2のピーク値記憶手段6には一つ前の再生動作時に於けるMX1、MX2に相当する値が記憶されておりそれらをMX3、MX4とすると、図6のステップ31ではピーク平均値算出手段8によりMX1、MX2、MX3、MX4についての平均値を算出し、ステップ32では第1のピーク値記憶手段5のMX1、MX2をそれぞれ第2のピーク値記憶手段6のMX3、MX4に転送し記憶する。つぎにステップ33では上記ピーク平均値算出手段8により算出した値と最大値記憶手段9に記憶されている値とを比較し大きければステップ34で更新する。またステップ35ではサーチ動作制御手段4によりトラックジャンプ動作を行い次の再生部分へ移動し、ディスク1の必要部分全体のサーチ動作が終了していなければステップ36からステップ22へ戻り上記最大ピーク値算出のための処理を繰り返す。

【0008】サーチ動作終了後はステップ36でそれを判別し、ステップ37からステップ40の処理に移る。すなわち、録音レベル設定手段10により、最大値記憶

手段9に記憶されている値と予め設定されている基準値との比較を行い録音レベルの設定を行う。例えば、基準値をA0h（16進数を表す。以下、同じ）、D0hとすると、A0h以上は録音手段12での入力 of 録音レベルを通常よりも3dB減衰、D0h以上は通常よりも6dB減衰等のように設定を行う。

【0009】以上のように、録音レベル設定手段10により設定された録音レベルで、信号処理手段3のオーディオ信号はDA変換手段11によりアナログ信号に変換され、録音手段12により録音動作が行われる。

【0010】一方、スピーカ16で音として聴取されるディスク1上の音楽信号は、DA変換手段11の出力より音量設定手段14に入力され、ここで機器の使用者の希望する音量に設定され、オーディオ信号増幅手段15にて電力増幅を受けた音楽信号がスピーカ16に入力されて音波信号として出力される。

【0011】

【発明が解決しようとする課題】しかしながら上記のような従来のディスク再生装置は、DA変換手段の後段の録音手段で録音レベル設定を行わねばならず録音レベル設定手段としてはマイクロコンピュータの出力ポートから信号を出力して録音手段の入力に設けたICまたはトランジスタや抵抗器等で構成されるアナログ減衰器回路を駆動する必要があった。このため録音手段で磁気テープなどに録音する録音レベルをユーザーの好みに応じて何段階か切り換えられるようにしようとするマイクロコンピュータの出力ポートを増やし、アナログ減衰器回路の規模を大きくしないと実現できず大変なコスト高になってしまうという問題点があった。

【0012】本発明は、上記従来の問題点に鑑み、録音レベル設定手段としてのアナログ減衰器回路を必要とせず磁気テープなどに録音する録音レベルをユーザーの好みに応じて何段階かに切り換えることのできる高機能で安価なディスク再生装置を提供することを目的とするものである。

【0013】

【課題を解決するための手段】上記課題を解決するために本発明のディスク再生装置は、第一の記録媒体であるディスク上の音楽信号を再生する再生手段と、前記再生手段からの再生出力信号を第二の記録媒体に録音する録音手段と、前記再生手段からの再生出力信号を前記録音手段により録音する録音レベルを手動で複数段階のうちの一つに切り換えるためのレベル登録をする録音レベル登録手段と、ディスク上に記録された音楽信号の一定時間毎のピーク値を検出しその値をデジタル信号で出力する信号処理手段と、再生動作とトラックジャンプ動作を交互に繰り返すことにより高速サーチ動作を行うよう制御するサーチ動作制御手段と、前記高速サーチ動作の第N番目の再生動作における前記信号処理手段からのピーク値を記憶する第1のピーク値記憶手段と、第(N-

1) 番目の再生動作における前記信号処理手段からのピーク値を記憶する第2のピーク値記憶手段と、再生動作時の信号読み取りエラーを検知し前記第1のピーク値記憶手段の記憶処理を制御するピーク値記憶制御手段と、再生動作時毎に前記第1のピーク値記憶手段と第2のピーク値記憶手段に記憶されている数値の平均値を算出するピーク平均値算出手段と、再生動作時毎に比較更新を行い前記ピーク平均値算出手段による平均値の最大値を記憶する最大値記憶手段と、前記高速サーチ動作終了時に最大値記憶手段に記憶されている最大値と予め設定された録音基準値との比較によりディスク上に記録されている音楽信号の記録レベルの高低を判別する記録レベル判別手段と、前記記録レベル判別手段の出力内容を表示する記録レベル表示手段と、前記記録レベル判別手段の出力内容と前記録音レベル登録手段の登録内容とで減衰量または増幅度を変化して録音レベルを切り換える録音レベル設定手段と、前記再生手段と結合され前記録音レベル設定手段で設定した減衰量の変化量に対応する量だけ前記音楽信号をスピーカ等へ出力する際の減衰量を補正して設定を行う再生レベル設定手段とを備えたものである。

【0014】

【作用】本発明は上記した構成によって、ディスクから磁気テープなどへ録音する際の録音レベルをユーザーの好みに応じて複数段階のうちの一つに切り換えるための録音レベル登録ができ、ディスク上に記録されている音楽信号の記録レベルの高低を判別し表示するとともに、記録レベルの判別結果と録音レベル登録内容とに応じて信号処理手段のデジタル減衰器で録音レベルを切り換えると同時に信号処理手段での録音レベル切換のための減衰量の変化に対応する量だけ音楽信号をスピーカへ出力する際の電子ボリュームでの減衰量を補正して設定を行うので、アナログ減衰器回路を必要とせず録音レベルをユーザーの好みに応じて何段階かに切り換えることのできる高機能で安価なディスク再生装置を実現することができる。

【0015】

【実施例】以下、本発明の一実施例のディスク再生装置について、図1～図4を参照しながら詳細に説明する。なお、図5～図7と同一の構成部分については同一の番号を付与し、説明を省略する。

【0016】図1は本発明の実施例におけるディスク再生装置の構成を示すブロック図である。

【0017】図1において、41は信号読み取り手段2からの信号を受けその一定時間毎のピーク値を検出しその値を8ビットのデジタル信号として出力すると同時に、公知のデジタル信号処理技術によってその信号をオーディオ信号に変換しながら後述する録音レベル設定手段43からの制御信号を受け内部の演算処理回路によって上記オーディオ信号をデジタル的に減衰させて出力で

きる構成を備えた信号処理手段、42は記録レベル判別手段17の出力内容によりディスク上の音楽信号の記録レベルを液晶表示装置などに表示する記録レベル表示手段、43は上記高速サーチ動作終了時に最大値記憶手段9に記憶されている最大値と予め設定された基準値との比較により上記オーディオ信号を磁気記録手段等の後述する録音手段45で録音する際のレベル設定のための制御信号を信号処理手段41に出力すると共に後述する再生レベル設定手段46の制御を行う録音レベル設定手段、44は再生手段2からの再生出力信号を録音手段45により録音するレベルを手動で複数段階のうちの一つに切り換えるためのレベル登録を機械式スイッチの位置切換などで設定する録音レベル登録手段、45は従来例のディスク再生装置と異なりICまたはトランジスタや抵抗器等で構成されるアナログ減衰器回路をその入力に有さないで一定の増幅度で録音動作を行う構成の録音手段、46はDA変換手段11からのオーディオ信号を機器の使用者が自由にその聴取レベルを設定できるように構成された再生レベル設定手段で、一般には音量調整ボリュームなどと呼ばれているが、本実施例に於いては録音レベル設定手段43からの制御信号によってオーディオ信号の減衰量又は増幅度を増減できる機能も合わせ持つ電子ボリュームなどと呼ばれているものである。

【0018】図2～図4は図1に示した各部の処理内容を示すフローチャート図である。以上のように構成されたディスク再生装置について、以下その動作について説明する。

【0019】まず録音レベル登録手段44は高低の段階が3段階有り、「HIGH」、「NORMAL」、「LOW」の内からユーザーが録音したい録音レベルを手動で機械式スイッチの位置を切り換えて登録しているものとする。この録音レベル登録手段44の登録内容はマイクロコンピュータで機械式スイッチの端子電圧を読みとることによりその設定位置を検出することが出来る。

【0020】ピークサーチスタートスイッチ13をONする事によりピークサーチ動作を開始すると、図2のステップ51、22に示すようにピーク平均値算出手段8、第1、第2のピーク値記憶手段5、6を初期リセットし、信号処理手段41のデジタル減衰量を-4dBの標準値に設定する。ここで信号処理手段41のデジタル減衰量を0dBではなく-4dBに設定するのは信号処理手段41で増幅することは出来ず減衰するのみであり、ディスク1の記録レベルや録音レベル登録手段44の登録内容によってはデジタル減衰量を標準状態よりも小さくして録音レベルを大きくする必要があるからである。

【0021】次に、サーチ動作制御手段4により再生手段2に対して一定時間の再生動作とトラックジャンプ動作を交互に行いサーチ動作を行うよう制御する。本実施例では図2のステップ30に示すようにピーク値を4回

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読みとる毎に1回トラックジャンプするよう構成した。

【0022】再生動作においては再生手段2によりディスク1に記録された信号を読みとり、ステップ23に示すように信号処理手段41によりオーディオ信号に変換すると共に一定時間毎のピーク値を検出し出力する。第1のピーク値記憶手段5では1番目に大きな値と2番目に大きな値とを記憶するのでそれらをMX1、MX2とすると、図2のステップ27、29で更新し第1のピーク値記憶手段5に記憶する。この時サーチ動作にエラーがありピーク値が検出できなかった場合にはステップ24、25に示すように、サーチ動作制御手段4がエラー発生検知を行いピーク値記憶手段7を制御して第1のピーク値記憶手段5に後述する基準値のうち最小の値を記憶させる。次にステップ30ではピークデータ値の読み取り回数チェックを行い、4回読み取るまではステップ23へ戻って上記処理を繰り返し、4回読み取り後はステップ31以降の処理に移る。第2のピーク値記憶手段6には一つ前の再生動作時に於けるMX1、MX2に相当する値が記憶されておりそれらをMX3、MX4とすると、図2のステップ31ではピーク平均値算出手段8によりMX1、MX2、MX3、MX4についての平均値を算出し、図3のステップ32では第1のピーク値記憶手段5のMX1、MX2をそれぞれ第2のピーク値記憶手段6のMX3、MX4に転送し記憶する。つぎにステップ33では上記ピーク平均値算出手段8により算出した値と最大値記憶手段9に記憶されている値とを比較し平均値の方が大きければステップ34で最大値記憶手段9の値を更新する。またステップ35ではサーチ動作制御手段4によりトラックジャンプ動作を行い次の再生部分へ移動し、ステップ22へ戻り上記最大ピーク値算出のための処理を繰り返す。

【0023】サーチ動作終了後は図3のステップ36でそれを判別し、ステップ37とステップ39の記録レベルの判断処理に移る。すなわち、ここでは最大値記憶手段9に記憶されている値と予め設定されている基準値とのを比較して記録レベル判別手段17の動作を行い、その後ステップ52以降でディスク1の音楽信号の記録レベルの表示処理と、音楽信号の記録レベルの判断結果と録音レベル登録手段44の登録内容とに対応した信号処理手段41でのデジタル減衰量の変化による録音レベルの設定と、再生レベル設定手段43での電子ボリュームの減衰量の変化による再生レベル設定とを行う。

【0024】例えば、記録レベル判断のための基準値をA0h、D0hとすると、録音レベル登録手段44の登録内容が「NORMAL」の場合には、A0hからD0hの間ではステップ52で記録レベルを「普通」と表示するとともにステップ57で信号処理手段41の減衰量と再生レベル設定手段43の設定レベルは通常と同じとし、D0h以上はステップ58で記録レベルを「高」と表示するとともにステップ64で信号処理手段41の減

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衰量を通常よりも2dB減衰、再生レベル設定手段43の設定レベルを2dB増加させるように設定し、A0hよりも小さければステップ59で記録レベルを「低」と表示するとともにステップ64で信号処理手段41の減衰量を通常よりも2dB増加、再生レベル設定手段43の設定レベルを2dB減衰させるように設定を行う。

【0025】録音レベル登録手段44の登録内容が「NORMAL」以外の場合にも上記と同様に、信号処理手段41の減衰量と再生レベル設定手段43の減衰量を増加、減衰または変えずというように制御する。

【0026】以上のように、信号処理手段41によりレベル設定されたデジタルオーディオ信号は、DA変換手段11によりアナログ信号に変換され録音手段45により録音動作が行われる。

【0027】一方、スピーカ16で音として聴取されるディスク1上の音楽信号は、DA変換手段11の出力より再生レベル設定手段46に入力され、ここで信号処理手段41でのデジタル減衰量の変化量に見合う再生レベル設定の変化量の補正を受けることにより、機器の使用者の希望する音量に固定され、オーディオ信号増幅手段15にて電力増幅を受けた音楽信号がスピーカ16に入力されて音波信号として出力される。

【0028】具体的計算例を以下に示す。信号処理手段41により検出されたピーク値が1回目の再生動作で(30h, 8Dh, E0h, D8h), 2回目(A0h (=エラー), D0h, E8h, C0h), 3回目(F0h, B8h, A8h, A0h)とすると、1回目の再生動作では第1のピーク値記憶手段5にMX1=E0h, MX2=D8hが記憶され、更に第2のピーク値記憶手段6にMX3, MX4としてそれぞれ転送される。次にトラックジャンプを経た2回目の再生動作では信号読み取りにエラーがあったことが検知されておりA0hのデータが補われ第1のピーク値記憶手段5には結果的にMX1=E8h, MX2=D0hが記憶される。この時、MX3=E0h, MX4=D8hであるからピーク平均値算出手段8による演算結果による平均値はDChと成り最大値記憶手段9にその値が記憶される。また3回目の再生動作ではMX1=F0h, MX2=B8h, MX3=E8h, MX4=D0h、その平均はD8hとなりF0hという最大値があるにも関わらず2回目の再生動作時よりも平均値は小さくなるので最大値記憶手段9の値は更新されない。高速サーチ動作終了時に於いて最大値記憶手段9に記憶されている値がDChであれば基準値D0hに対してD0h<DChなのでステップ39の条件が真となる。これによりステップ58以降が実行される。

【0029】録音レベル登録手段44が「NORMAL」であった場合を想定すると、ステップ64で録音レベル設定手段43は信号処理手段41を制御してデジタル信号出力を通常状態よりも2dB減衰するように設定

し、このためDA変換手段11の音楽信号出力も2dB減衰し、録音手段45で記録されるオーディオ信号も2dB減衰する。これと同時に、録音レベル設定手段43は再生レベル設定手段46を制御してオーディオ信号増幅手段15への出力を通常状態よりも2dB増加させスピーカ16よりの音楽信号の音波出力レベルを、録音レベル登録手段44の登録内容やディスク1上の音楽信号の記録レベルの高低に差が有る場合でも、見かけ上変化がないように制御する。

【0030】なお、本発明の実施例では録音レベル登録手段として機械式スイッチをある位置に設定することで登録する構成としたが、押しボタンスイッチの押す回数をマイクロコンピュータ等で計数して登録して液晶表示器などの表示手段に登録内容を表示するなどの構成としてもよい。

【0031】また、本発明の実施例では録音レベル登録手段とディスク上の音楽信号の記録レベルとを考慮して信号処理手段と再生レベル設定手段の減衰量を設定する構成としたが、ディスク上の音楽信号の記録レベルを確認するための高速サーチ動作を行わずに、ただ単純に信号処理手段と再生レベル設定手段の減衰量を録音レベル登録手段の登録内容のみに対応して標準の状態から変化させる構成としてもよい。

【0032】また、本発明の実施例ではディスク上の音楽信号の記録レベルを判断するための高速サーチ動作を行ってすぐに録音レベル登録手段の登録内容により信号処理手段と再生レベル設定手段の減衰量を設定する構成としたが、高速サーチをしてディスク上の音楽信号の記録レベルを判断、表示してから録音レベル登録手段のユーザーによる登録を待ち登録が済んでから録音開始のキー入力待ち、録音開始指示が有ってからディスク上の音楽信号の記録レベルと録音レベル登録手段の登録内容により信号処理手段と再生レベル設定手段の減衰量を設定し録音を開始するなどの構成としてもよい。

【0033】また、本発明の実施例では録音手段として磁気記録媒体を用いたが光磁気ディスクなどの他の記録媒体などを用いてもよい。

【0034】また、本発明の実施例では記録レベル表示手段で液晶表示器などの表示手段にディスク上の音楽信号の記録レベルの高低の表示を行う構成としたが表示とともに音声合成信号などを発音させるなどの構成としてもよい。

【0035】また、本発明の実施例では信号処理手段と再生レベル設定手段の減衰量は2dB毎に変化させる構成としたが、3dB毎にするなど他の値を用いてもよい。また、録音レベル登録手段の内容やディスク上の音楽信号の記録レベルの大小により必ずしも一定のdB量ずつ変化させなくともよい。例えば録音レベル登録手段の登録内容が「HIGH」と「NORMAL」では減衰量の変化が3dB、「LOW」と「NORMAL」では

減衰量の変化が2dB、などというように制御する構成としてもよい。

【0036】

【発明の効果】以上のように本発明によれば、ディスクから磁気テープなどへ録音する際の録音レベルをユーザーの好みに応じて複数段階のうちの一つに切り換えるための録音レベル登録ができ、ディスク上に記録されている音楽信号の記録レベルの高低を判別し表示するとともに、記録レベルの判別結果と録音レベル登録内容とに応じて信号処理手段のデジタル減衰器で録音レベルを切り換えると同時に信号処理手段での録音レベル切換のための減衰量の変化に対応する量だけ音楽信号をスピーカへ出力する際の電子ボリュームでの減衰量を補正して設定を行うので、違和感を生じるようなスピーカからの音波出力レベルの変化を生じることなく磁気テープなどへの録音レベルをユーザーの好みに応じて切り換えることができる。従って、従来のディスク再生装置のように、録音手段の入力にアナログ減衰器等の回路部品を必要とせず、その制御のための専用のマイクロコンピュータ等の入出力端子も必要とはしない。

【0037】よって、録音レベルをユーザーの好みに応じて何段階かに切り換えることのできる高機能で安価なディスク再生装置を実現することができることとなり、その効果は非常に大なるものである。

【図面の簡単な説明】

【図1】本発明の実施例におけるディスク再生装置の構成を示すブロック図

【図2】本発明の実施例におけるディスク再生装置のフローチャート

【図3】本発明の実施例におけるディスク再生装置のフローチャート

【図4】本発明の実施例におけるディスク再生装置のフローチャート

【図5】従来のディスク再生装置の構成を示すブロック図

【図6】従来のディスク再生装置のフローチャート

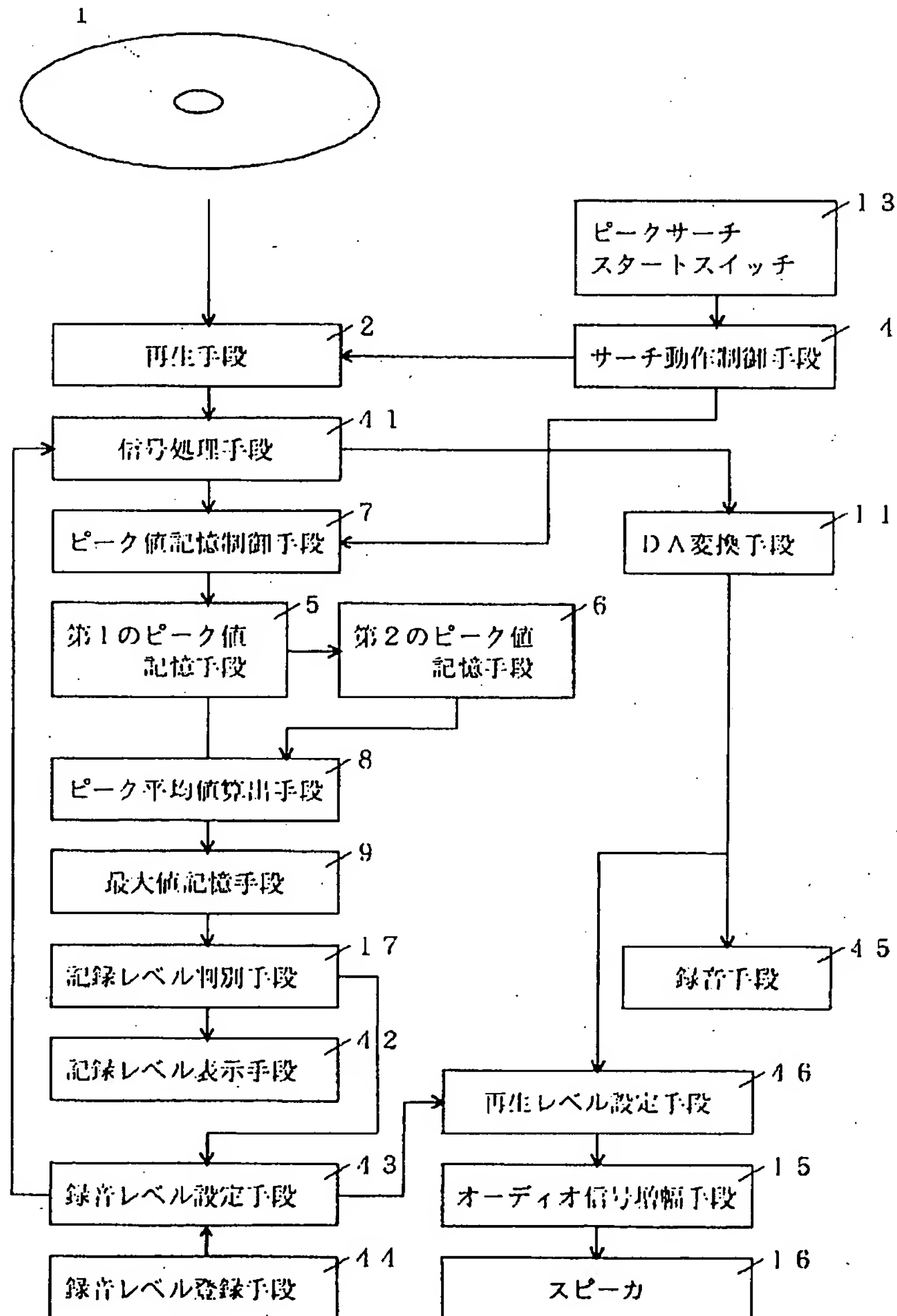
【図7】従来のディスク再生装置のフローチャート

【符号の説明】

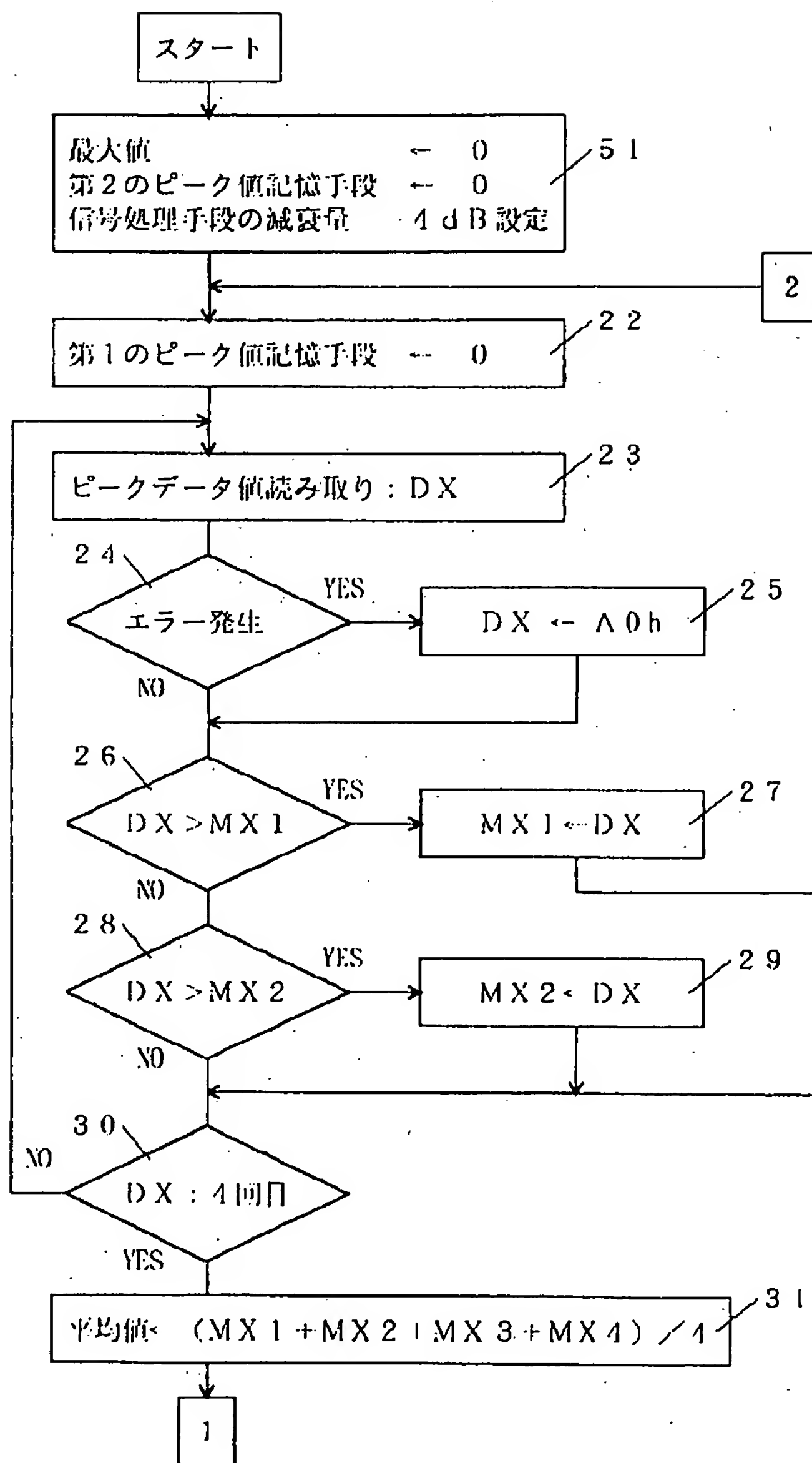
- 1 ディスク
- 2 再生手段
- 4 サーチ動作制御手段
- 7 ピーク値記憶制御手段
- 8 ピーク平均値算出手段
- 9 最大値記憶手段
- 17 記録レベル判別手段
- 41 信号処理手段
- 42 記録レベル表示手段
- 44 録音レベル登録手段
- 43 録音レベル設定手段
- 45 録音手段

4 6 再生レベル設定手段

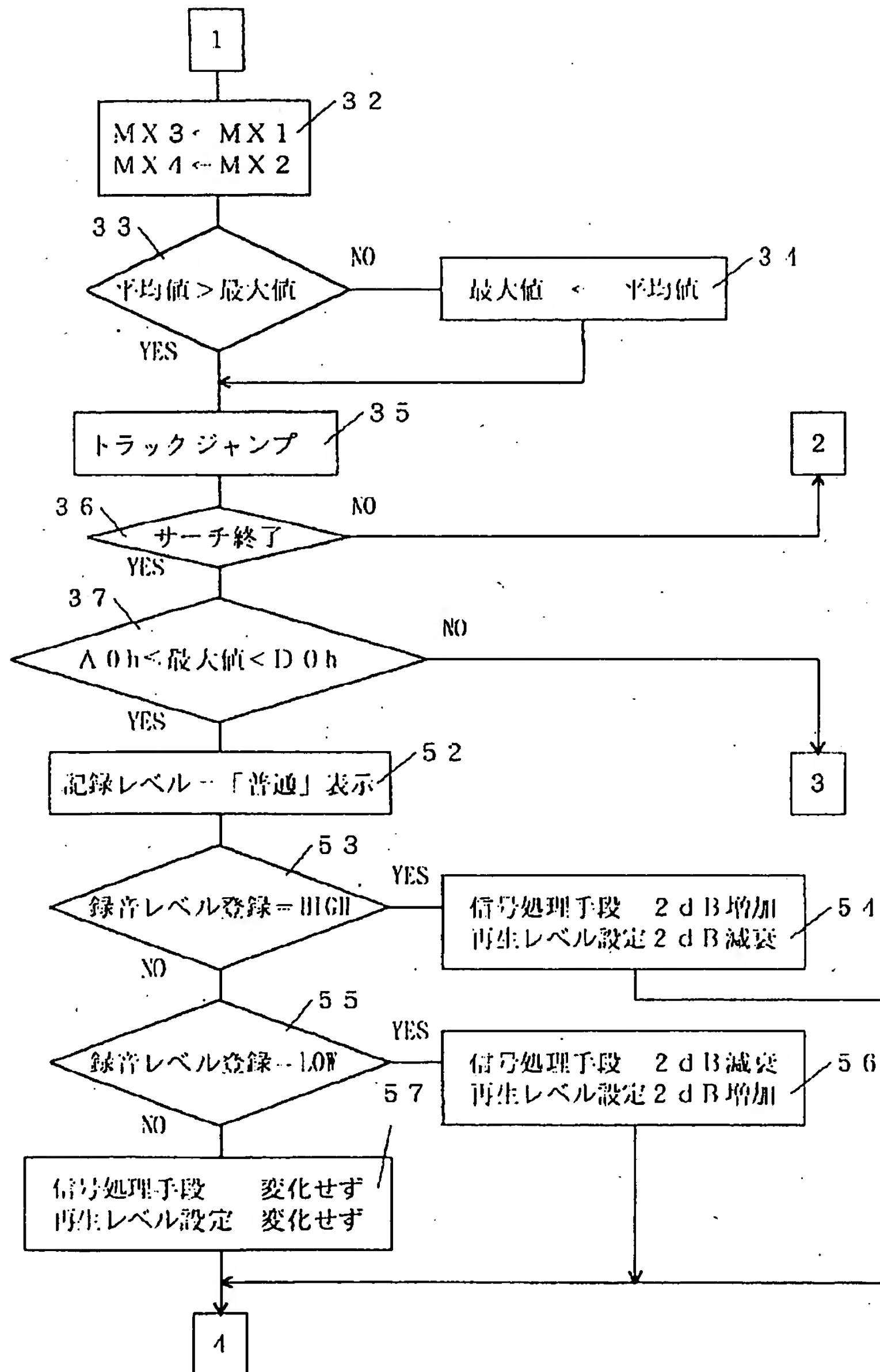
【図1】



【図2】



【図3】

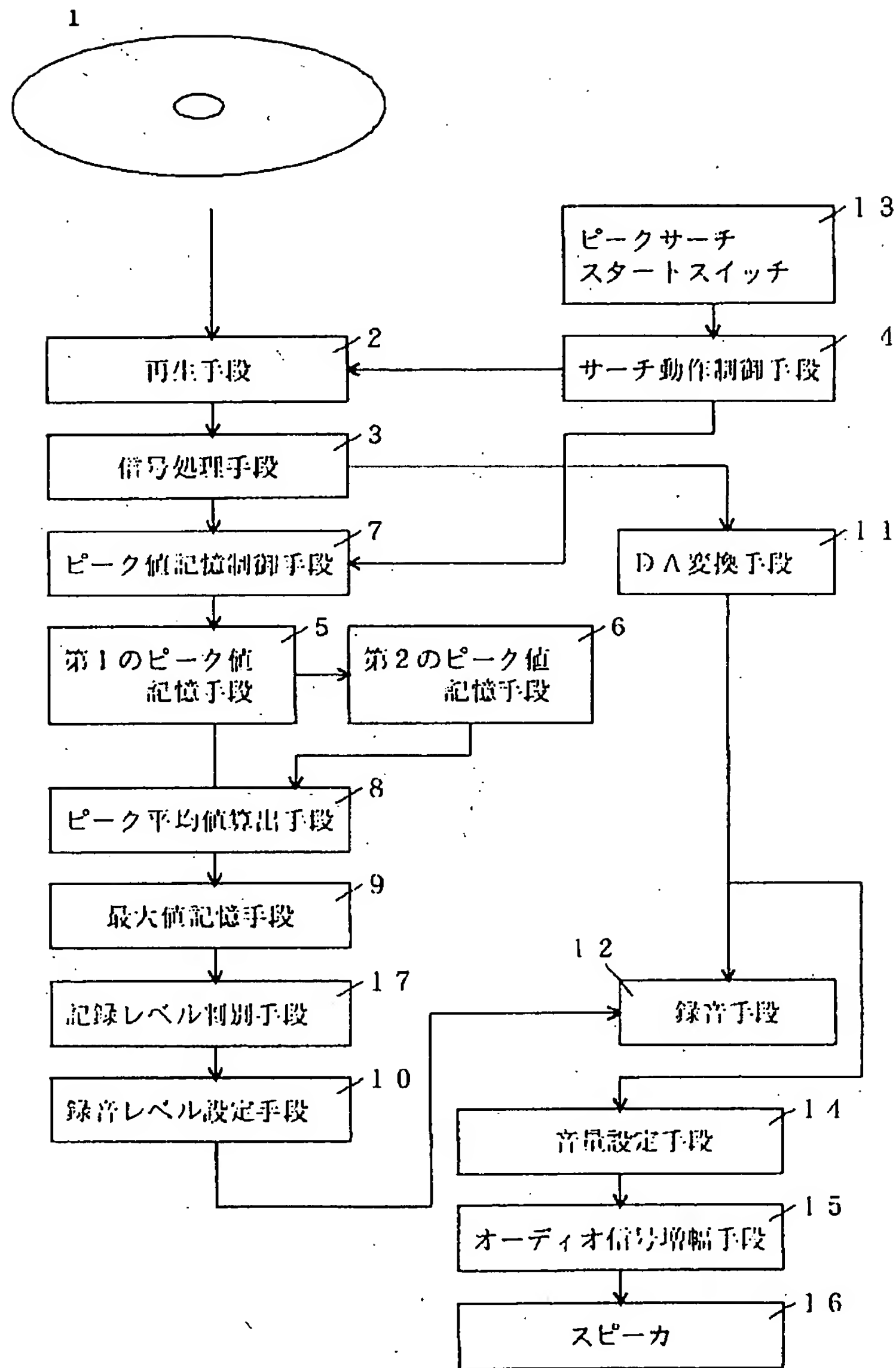


```

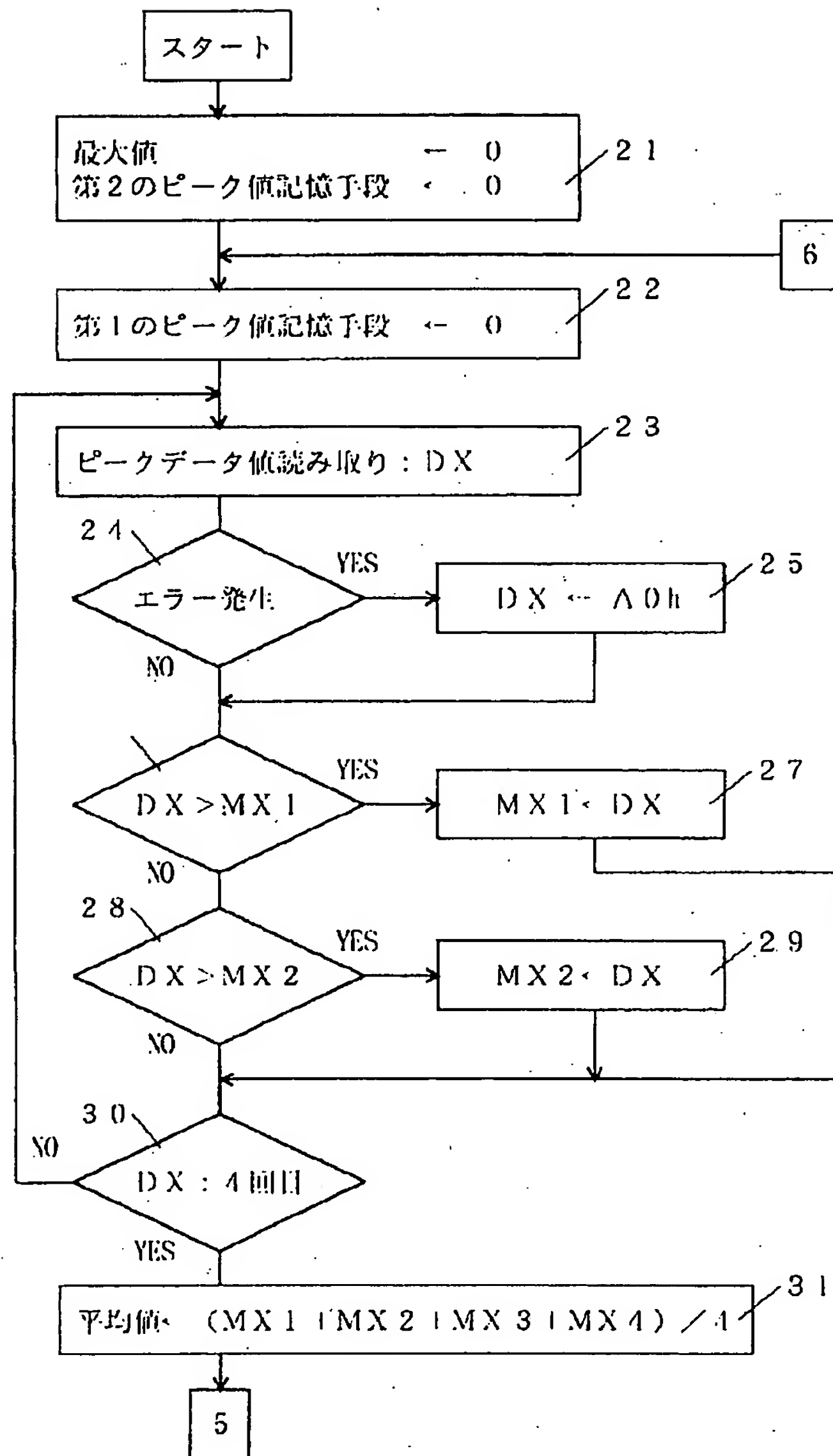
graph TD
    3[3] --> 39{3 9  
最大値 > 100h}
    39 -- YES --> 58[5 8  
記録レベル - 「高」表示]
    39 -- NO --> 59[5 9  
記録レベル - 「低」表示]
    58 --> 60{6 0  
録音レベル登録 = HIGH}
    60 -- YES --> 61[6 1  
信号処理手段 変化せず  
再生レベル設定 変化せず]
    60 -- NO --> 62{6 2  
録音レベル登録 = LOW}
    62 -- YES --> 63[6 3  
信号処理手段 4 dB 減衰  
再生レベル設定 4 dB 増加]
    62 -- NO --> 64[6 4  
信号処理手段 2 dB 減衰  
再生レベル設定 2 dB 増加]
    59 --> 65{6 5  
録音レベル登録 = HIGH}
    65 -- YES --> 66[6 6  
信号処理手段 4 dB 増加  
再生レベル設定 4 dB 減衰]
    65 -- NO --> 67{6 7  
録音レベル登録 = LOW}
    67 -- YES --> 68[6 8  
信号処理手段 変化せず  
再生レベル設定 変化せず]
    67 -- NO --> 69[6 9  
信号処理手段 2 dB 増加  
再生レベル設定 2 dB 減衰]
    61 --> 4[4]
    63 --> 4
    64 --> 4
    66 --> 4
    68 --> 4
    69 --> 4
    4 --> 終わり[おわり]

```

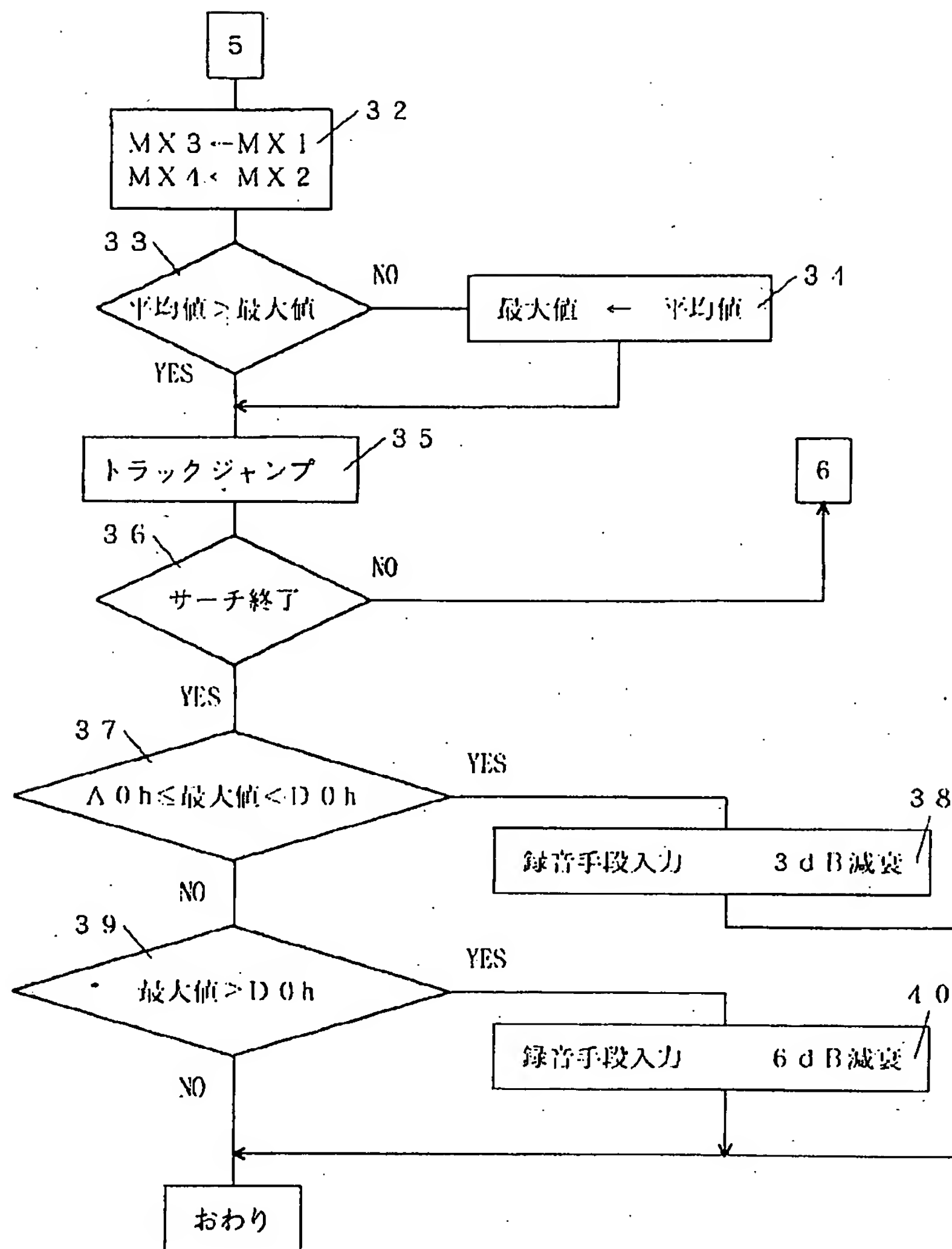
【図5】



【図6】



【図7】



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 26.09.1994

(72)Inventor : ENDO SATOSHI
TSUJIMOTO TOKUO

(54) DISK REPRODUCING DEVICE

(57)Abstract:

PURPOSE: To provide a disk reproducing device which is high in performance and inexpensive by discriminating and displaying the height of the recording level of musical signals of the disk and switching the recording level onto a magnetic tape or the like from a disk at some stages in accordance with the taste of the user.

CONSTITUTION: The recording level discriminating means 17 discriminates the height of the recording level of the musical signals recorded on the disk 1. In accordance with its result and the registered content of the recording level registration means 44, the digital attenuator in the signal processing means 41 switches the recording level. At the same time, the amount of attenuation in the reproducing level setting means which sets the amplification factor required for outputting the musical signals to the speaker is corrected by the amount corresponding to the change of attenuation for switching the recording level in the signal processing means 41.

